URS

21 October 2014

Project No. 42908633

Hans Jacob
Infrastructure Assessments
Office of the Environmental Projection Authority
Locked bag 33
CLOISTERS SQUARE WA 6850

Dear Mr Jacob

Subject: Barrow Island Marine Fibre Optic Cable Installation - Referral

On behalf of Telstra Corporation Limited (Telstra), URS Australia Pty Limited (URS) are submitting a proposal to the Environmental Protection Authority (EPA) for referral under Section 38(1) of the *Environmental Protection Act* 1986. Please find enclosed a hard copy of the EPA Referral Form and supporting information.

Submission of this referral follows consultation undertaken with yourself and Anthony Sutton on the 1 July 2014. During this consultation the project details and potential impacts were discussed, which have been detailed in the enclosed referral.

As the project crosses the Barrow Island Marine Management Area (MMA), URS and Telstra have undertaken consultation with the Department of Parks and Wildlife (DPaW) to discuss potential environmental impacts to the MMA. DPaW requested Telstra prepare and submit an Environmental Management Plan for cable laying activities in the MMA. URS, on behalf of Telstra, have prepared a Cable Laying EMP which will be submitted to DPaW for their approval.

Should you have any questions on the above please don't hesitate to contact me on 08 9326 0268 or Michael.jones02@urs.com.

Yours sincerely
URS Australia Pty Ltd

Michael Jones
Senior Environmental Scientist

Enclosures
Attachments

Cc – Mike Hall
Senior Strategy Specialist
Telstra Operations

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GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

EPA REFERRAL FORM PROPONENT

Referral of a Proposal by the Proponent to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986*.

PURPOSE OF THIS FORM

Section 38(1) of the *Environmental Protection Act 1986* (EP Act) provides that where a development proposal is likely to have a significant effect on the environment, a proponent may refer the proposal to the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a proponent.

Proponents are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes] before completing this form.

A referral under section 38(1) of the EP Act by a proponent to the EPA must be made on this form. A request to the EPA for a declaration under section 39B (derived proposal) must be made on this form. This form will be treated as a referral provided all information required by Part A has been included and all information requested by Part B has been provided to the extent that it is pertinent to the proposal being referred. Referral documents are to be submitted in two formats – hard copy and electronic copy. The electronic copy of the referral will be provided for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

CHECKLIST

Before you submit this form, please check that you have:

	Yes	No
Completed all the questions in Part A (essential).	x	
Completed all applicable questions in Part B.	x	
Included Attachment 1 – location maps.	x	
Included Attachment 2 – additional document(s) the proponent wishes to provide (if applicable).	x	
Included Attachment 3 – confidential information (if applicable).		x
Enclosed an electronic copy of all referral information, including spatial data and contextual mapping but excluding confidential information.	x	

Following a review of the information presented in this form, please consider the following question (a response is optional).

Do you consider the proposal requires formal environmental impact assessment?		
☐ Yes	☒ No	☐ Not sure
If yes, what level of assessment?		
☐ Assessment on Proponent Information	☐ Public Environmental Review	

PROPONENT DECLARATION (to be completed by the proponent)

I, **Mike Hall**, *(full name)* declare that I am authorised on behalf of Telstra Corporation (being the person responsible for the proposal) to submit this form and further declare that the information contained in this form is true and not misleading.

Signature M Hall	Name (print) MIKE HALL
Position Senior Strategy Specialist.	Company Telstra
Date 16/10/2014.	

PART A - PROPONENT AND PROPOSAL INFORMATION

(All fields of Part A must be completed for this document to be treated as a referral)

1 PROPONENT AND PROPOSAL INFORMATION

1.1 Proponent

Name	Telstra Corporation Limited
Joint Venture parties (if applicable)	n/a
Australian Company Number (if applicable)	33 05 775 556
Postal Address (where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State)	Telstra Operations 8/30 Pirie Street Adelaide South Australia
Key proponent contact for the proposal: • name • address • phone • email	Mike Hall Senior Strategy Specialist 08 8433 4702 Mike.j.hall@team.telstra.com
Consultant for the proposal (if applicable): • name • address • phone • email	URS Australia Pty Ltd Level 4, 226 Adelaide Terrace, Perth, WA 6000 08 9326 0268 Michael.jones02@urs.com

1.2 Proposal

Title	*Barrow Island Marine Fibre Optic Cable Installation*
Description	*Marine installation of a fibre optic cable.* *The cable will be directly laid on the seabed from a specialised dynamically-positioned cable laying vessel, with assistance from a shore end barge in shallow waters.* *The marine route can be split into two sections, inside State waters and outside of State waters, as follows:* • *Submarine cable within WA State waters (approximately 270 kilometres (km) in length): The cable would be laid from Onslow to Barrow Island jetty and to Gnoorea Point landing.* • *Submarine cable outside of WA State waters (approximately 222 km in length): The cable would be laid to the Wheatstone Gas Platform.* *The route alignment for the cable is shown in Figure 1 in the attached supporting information. The cable outside of State waters is not considered a matter of consideration for the EPA, and will be discussed with the Department of the Environment (DoE). Therefore the focus of this referral is those areas within WA State waters.*
Extent (area) of proposed ground disturbance.	*The project is a linear infrastructure with a small footprint. The submarine cable will be a diameter up to 25 millimetres (mm). The fibre optic cable will run for 270 km in WA State waters; though the installation method will lead to minimal ground disturbance within only a narrow corridor (width in the order of metres).*

Timeframe in which the activity or development is proposed to occur (including start and finish dates where applicable).	*Construction is likely to commence in the last quarter of 2015, and last for approximately 5 months. The life of the cable is a minimum of 30 years and removal of the decommissioned cable is not considered feasible. The potential environmental impacts of retrieving and disposing of the cable are likely to outweigh the impacts of leaving the cable in place. Additionally it is likely that over time the cable will provide a structure for colonisation of habitat forming species.*
Details of any staging of the proposal.	*No staging required.*
Is the proposal a strategic proposal?	*No.*
Is the proponent requesting a declaration that the proposal is a derived proposal? If so, provide the following information on the strategic assessment within which the referred proposal was identified: • title of the strategic assessment; and • Ministerial Statement number.	*No, the proponent is not seeking a derived proposal.*
Please indicate whether, and in what way, the proposal is related to other proposals in the region.	*There is a terrestrial section of the Project which is being dealt with separately under the Telecommunications Act 1997 by Telstra.*
Does the proponent own the land on which the proposal is to be established? If not, what other arrangements have been established to access the land?	*No. Part of the route is through the Barrow Island Marine Management Area (approx. 7 km of cable). Telstra is consulting with the Department of Parks and Wildlife as to access requirements for the marine management area. Telstra is undertaking consultation with local shires as to access to land connections.*
What is the current land use on the property, and the extent (area in hectares) of the property?	*The Project is within a marine area utilised by commercial and recreational vessels. The Project will pass through the Barrow Island Marine Management Area; uses within this area are governed by a management plan. Land connections are on Shire land. At Gnoorea Point the current land use is as a Shire Reserve (Shire of Roebourne) and camp site.*

1.3 Location

Name of the Shire in which the proposal is located.	*Situated in a marine area. Land connections are in Shire of Ashburton and Shire of Roebourne.*
For urban areas: • street address; • lot number; • suburb; and • nearest road intersection.	*n/a*
For remote localities: • nearest town; and • distance and direction from that town to the proposal site.	*The nearest town is Onslow. Please see Figure 1 in supporting information. The cable passes into Onslow.*
Electronic copy of spatial data - GIS or CAD, geo-referenced and conforming to the following parameters: • GIS: polygons representing all activities and named; • CAD: simple closed polygons representing all activities and named; • datum: GDA94; • projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA); • format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD.	*Enclosed?: Yes*

1.4 Confidential Information

Does the proponent wish to request the EPA to allow any part of the referral information to be treated as confidential?	*No.*
If yes, is confidential information attached as a separate document in hard copy?	*n/a*

1.5 Government Approvals

Is rezoning of any land required before the proposal can be implemented? If yes, please provide details.		*No rezoning required.*	
Is approval required from any Commonwealth or State Government agency or Local Authority for any part of the proposal? If yes, please complete the table below.		*Yes.*	
Agency/Authority	Approval required	Application lodged Yes / No	Agency/Local Authority contact(s) for proposal
Department of the Environment	*Referral to be undertaken. Assumed not a controlled action.*	*No (To be lodged)*	*Michael Ward*

Department of Parks and Wildlife	*Licences.*	*No (To be lodged)*	*Tara Jonas/ Hayley Bain*
Australian Communications and Media Authority	*Authorisation to install under Schedule 3 of the Telecoms Act*	*No (To be lodged)*	*TBC*

PART B - ENVIRONMENTAL IMPACTS AND PROPOSED MANAGEMENT

2. ENVIRONMENTAL IMPACTS

Describe the impacts of the proposal on the following elements of the environment, by answering the questions contained in Sections 2.1-2.11:

2.1 flora and vegetation;

2.2 fauna;

2.3 rivers, creeks, wetlands and estuaries;

2.4 significant areas and/ or land features;

2.5 coastal zone areas;

2.6 marine areas and biota;

2.7 water supply and drainage catchments;

2.8 pollution;

2.9 greenhouse gas emissions;

2.10 contamination; and

2.11 social surroundings.

These features should be shown on the site plan, where appropriate.

For all information, please indicate:

(a) the source of the information; and

(b) the currency of the information.

2.1 Flora and Vegetation

2.1.1 Do you propose to clear any native flora and vegetation as a part of this proposal?

[A proposal to clear native vegetation may require a clearing permit under Part V of the EP Act (Environmental Protection (Clearing of Native Vegetation) Regulations 2004)]. Please contact the Department of Environment and Conservation (DEC) for more information.

(please tick) ☐ Yes **If yes**, complete the rest of this section.

x No **If no**, go to the next section

2.1.2 How much vegetation are you proposing to clear (in hectares)?

2.1.3 Have you submitted an application to clear native vegetation to the DEC (unless you are exempt from such a requirement)?

☐ Yes ☐ No **If yes**, on what date and to which office was the application submitted of the DEC?

2.1.4 Are you aware of any recent flora surveys carried out over the area to be disturbed by this proposal?

☐ Yes ☐ No **If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

If no, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

2.1.5 Has a search of DEC records for known occurrences of rare or priority flora or threatened ecological communities been conducted for the site?

☐ Yes ☐ No If you are proposing to clear native vegetation for any part of your proposal, a search of DEC records of known occurrences of rare or priority flora and threatened ecological communities will be required. Please contact DEC for more information.

2.1.6 Are there any known occurrences of rare or priority flora or threatened ecological communities on the site?

☐ Yes ☐ No **If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

2.1.7 If located within the Perth Metropolitan Region, is the proposed development within or adjacent to a listed Bush Forever Site? (You will need to contact the Bush Forever Office, at the Department for Planning and Infrastructure)

☐ Yes ☐ No **If yes**, please indicate which Bush Forever Site is affected (site number and name of site where appropriate).

2.1.8 What is the condition of the vegetation at the site?

2.2 Fauna

2.2.1 Do you expect that any fauna or fauna habitat will be impacted by the proposal?

(please tick) x Yes **If yes**, complete the rest of this section.

☐ No **If no**, go to the next section.

2.2.2 Describe the nature and extent of the expected impact.

See attached supporting information, Table 5-1 Environmental Factors and Potential Impacts and Management Measures.

Impacts to species can be from light, noise, vessel strikes, loss of habitat and sediment which may be stirred up from the construction methodology.

DPAW listed species may utilise the beach nearshore environment where the proposed cable landfalls may occur, however, construction at the beach crossings will be undertaken over a short period of time, limiting the potential for light, noise and vessel strike impacts. Directional drilling will be undertaken at the shore crossings which will avoid impacts to near shore habitats.

While Telstra has advised that no night works will take place at land fall points, consideration will be given to vessel light sources during mooring and to onshore lighting at the shore crossings. Any lighting impacts are likely to be minimal.

24 hour operations will take place for cable laying away from the land fall. However, no light sources will be used on the sea surface, and minimal light is required for operations.

Sediment impacts will be limited to directional drilling for shore crossings. These will be limited to the construction period and will be minor in nature. As turtles can live in turbid environments, they are unlikely to be directly impacted by disturbance to sediment. Potential indirect impacts could occur from sedimentation of turtle food sources (e.g. seagrass and macroalgal beds and filter feeder communities). However, the impact footprint would be minuscule compared to the areas of similar habitat within the region, hence there would be negligible risk of significant impacts upon turtle populations.

Potential impacts to marine mammals and turtles can be from vessel strikes. The cable laying vessels will be running at less than 2 knots; this will make vessel strikes on marine mammals and turtles highly unlikely.

2.2.3 Are you aware of any recent fauna surveys carried out over the area to be disturbed by this proposal?

X Yes ☐ No **If yes**, please attach a copy of any related survey reports and provide the date and name of persons / companies involved in the survey(s).

If no, please do not arrange to have any biological surveys conducted prior to consulting with the DEC.

A towed camera survey has been undertaken to capture up-to-date information on any benthic primary producer habitats along the cable route. The habitat survey was undertaken in September 2014 by Geo Oceans Pty Ltd.

Details of the habitat survey are given in Section 4.5 of the attached supporting information.

2.2.4 Has a search of DEC records for known occurrences of Specially Protected (threatened) fauna been conducted for the site?

X Yes ☐ No (please tick)

2.2.5 Are there any known occurrences of Specially Protected (threatened) fauna on the site?

X Yes ☐ No **If yes**, please indicate which species or communities are involved and provide copies of any correspondence with DEC regarding these matters.

See attached supporting information, Table 5-1 Environmental Factors and Potential Impacts and Management Measures.

A DPAW Naturemap database search (Appendix B of supporting information) identified four species considered Rare or likely to become extinct (Loggerhead Turtle, Green Turtle, Leatherback Turtle and Flatback Turtle), seven migratory bird species protected under international agreements (JAMBA/CAMBA etc.) and one Priority 4 species (Indo-Pacific Humpbacked Dolphin) that may occur within the Project Area.

The area is also known as a migration route for a number of whale species, including Humpback Whales, which are listed as vulnerable under the Wildlife Conservation Act 1950 (WC Act) Schedule 1 (rare or likely to become extinct). Dugongs are known in the area, and are listed under schedule 4 of the WC Act.

No Threatened Ecological Communities were identified during the database search.

Apache Energy carried out a survey of the beaches near Gnoorea Point (for the Devil Creek horizontal direction drilling (HDD) crossing). Turtle nesting activity was observed on eastern beaches some distance from the crossing.

2.3 Rivers, Creeks, Wetlands and Estuaries

2.3.1 Will the development occur within 200 metres of a river, creek, wetland or estuary?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

x No **If no**, go to the next section.

2.3.2 Will the development result in the clearing of vegetation within the 200 metre zone?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.3 Will the development result in the filling or excavation of a river, creek, wetland or estuary?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.4 Will the development result in the impoundment of a river, creek, wetland or estuary?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.5 Will the development result in draining to a river, creek, wetland or estuary?

☐ Yes ☐ No **If yes**, please describe the extent of the expected impact.

2.3.6 Are you aware if the proposal will impact on a river, creek, wetland or estuary (or its buffer) within one of the following categories? (please tick)

Conservation Category Wetland	☐ Yes	☐ No	☐ Unsure
Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998	☐ Yes	☐ No	☐ Unsure
Perth's Bush Forever site	☐ Yes	☐ No	☐ Unsure
Environmental Protection (Swan & Canning Rivers) Policy 1998	☐ Yes	☐ No	☐ Unsure
The management area as defined in s4(1) of the *Swan River Trust Act 1988*	☐ Yes	☐ No	☐ Unsure
Which is subject to an international agreement, because of the importance of the wetland for waterbirds and waterbird habitats (e.g. Ramsar, JAMBA, CAMBA)	☐ Yes	☐ No	☐ Unsure

2.4 Significant Areas and/ or Land Features

2.4.1 Is the proposed development located within or adjacent to an existing or proposed National Park or Nature Reserve?

☐ Yes x No **If yes**, please provide details.

2.4.2 Are you aware of any Environmentally Sensitive Areas (as declared by the Minister under section 51B of the EP Act) that will be impacted by the proposed development?

☐ Yes x No **If yes**, please provide details.

2.4.3 Are you aware of any significant natural land features (e.g. caves, ranges etc) that will be impacted by the proposed development?

☐ Yes x No **If yes**, please provide details.

2.5 Coastal Zone Areas (Coastal Dunes and Beaches)

2.5.1 Will the development occur within 300metres of a coastal area?

(please tick) x Yes **If yes**, complete the rest of this section.

☐ No **If no**, go to the next section.

2.5.2 What is the expected setback of the development from the high tide level and from the primary dune?

The Project is for a fibre optic cable which may be laid across the subtidal and intertidal area of Onslow Beach and Gnoorea Point. Horizontal directional drilling will be undertaken at shore areas to minimise the risk of significant environmental impacts. See Section 2.3 of the attached supporting information.

2.5.3 Will the development impact on coastal areas with significant landforms including beach ridge plain, cuspate headland, coastal dunes or karst?

☐ Yes x No **If yes**, please describe the extent of the expected impact.

2.5.4 Is the development likely to impact on mangroves?

☐ Yes x No **If yes**, please describe the extent of the expected impact.

2.6 Marine Areas and Biota

2.6.1 Is the development likely to impact on an area of sensitive benthic communities, such as seagrasses, coral reefs or mangroves?

x Yes ☐ No **If yes**, please describe the extent of the expected impact.

See attached supporting information (Section 4.5 Benthic Habitats, Table 5-1 Environmental Factors and Potential Impacts and Management Measures).

Reduction in the quantity or quality of Benthic Primary Producer Habitat (BPPH) would have the potential to impact marine fauna food sources, recreational fishing values, commercial fishing resources and the general diversity and health of the marine ecosystem.

Along some sectors of the route, the cable will be laid in areas of BPPH. However only BPPH in the immediate vicinity of the cable will be disturbed and this area will be very small relative to the areal extent of similar BPPH in the region. As the Project activities will also be of short duration in each location, there is no credible risk that Project activities will result in significant impacts to sensitive benthic communities and habitats.

Directional drilling will be undertaken at shore crossings to further reduce the risk of impacts.

2.6.2 Is the development likely to impact on marine conservation reserves or areas recommended for reservation (as described in *A Representative Marine Reserve System for Western Australia*, CALM, 1994)?

x Yes ☐ No **If yes**, please describe the extent of the expected impact.

See attached supporting information, Table 5-1 Environmental Factors and Potential Impacts and Management Measures and Section 6 Consultation. The proposed cable traverses through the Barrow Island Marine Management Area (State marine reserve). The cable is expected to run for approximately 8 km through the Barrow Island Marine Management Area and has a diameter of up to 25 mm. However, a 10 m corridor (5 m either side of proposed cable route) has been allowed for as some slight movement of the cable may occur following laying.

As the cable will be laid onto the seabed with no pre- or post-lay seabed modification, the extent of impact to the benthic environment will be limited to habitat replacement (in areas of unconsolidated sediments) beneath the narrow footprint of the cable. The cable will be routed to deliberately avoid areas of higher relief hard substrate that may support coral communities.

The areas of the Barrow Island Marine Management Area (DPAW 2006) crossed by the proposed cable route are 'Unzoned Areas' which currently allow most commercial and recreational activities. The Barrow Island Management Plan (DEC 2006) states that an assessment is required by the EPA or DPAW for 'proposal[s] for marine infrastructure'.

2.6.3 Is the development likely to impact on marine areas used extensively for recreation or for commercial fishing activities?

☐ Yes x No **If yes**, please describe the extent of the expected impact, and provide any written advice from relevant agencies (e.g. Fisheries WA).

While the fibre optic cable will traverse areas that are zoned for commercial fishing (North Coast Prawn Managed Fishery and three Pilbara Demersal Scalefish Fisheries) and areas within which recreational fishing may intermittently occur, the frequency of these activities cannot be considered 'extensive'.

2.7 Water Supply and Drainage Catchments

2.7.1 Are you in a proclaimed or proposed groundwater or surface water protection area?

(You may need to contact the Department of Water (DoW) for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

☐ Yes x No **If yes**, please describe what category of area.

2.7.2 Are you in an existing or proposed Underground Water Supply and Pollution Control area?

(You may need to contact the DoW for more information on the requirements for your location, including the requirement for licences for water abstraction. Also, refer to the DoW website)

☐ Yes x No **If yes**, please describe what category of area.

2.7.3 Are you in a Public Drinking Water Supply Area (PDWSA)?

(You may need to contact the DoW for more information or refer to the DoW website. A proposal to clear vegetation within a PDWSA requires approval from DoW.)

☐ Yes x No **If yes**, please describe what category of area.

2.7.4 Is there sufficient water available for the proposal?

(Please consult with the DoW as to whether approvals are required to source water as you propose. Where necessary, please provide a letter of intent from the DoW)

x Yes ☐ No (please tick)

2.7.5 Will the proposal require drainage of the land?

☐ Yes x No **If yes**, how is the site to be drained and will the drainage be connected to an existing Local Authority or Water Corporation drainage system? Please provide details.

2.7.6 Is there a water requirement for the construction and/ or operation of this proposal?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

x No **If no**, go to the next section.

2.7.7 What is the water requirement for the construction and operation of this proposal, in kilolitres per year?

2.7.8 What is the proposed source of water for the proposal? (e.g. dam, bore, surface water etc.)

2.8 Pollution

2.8.1 Is there likely to be any discharge of pollutants from this development, such as noise, vibration, gaseous emissions, dust, liquid effluent, solid waste or other pollutants?

(please tick) ☐ Yes **If yes**, complete the rest of this section.

x No **If no**, go to the next section.

2.8.2 Is the proposal a prescribed premise, under the Environmental Protection Regulations 1987?

(Refer to the EPA's *General Guide for Referral of Proposals to the EPA under section 38(1) of the EP Act 1986* for more information)

☐ Yes x No **If yes**, please describe what category of prescribed premise.

2.8.3 Will the proposal result in gaseous emissions to air?

☐ Yes x No **If yes**, please briefly describe.

2.8.4 Have you done any modelling or analysis to demonstrate that air quality standards will be met, including consideration of cumulative impacts from other emission sources?

☐ Yes x No **If yes**, please briefly describe.

2.8.5 Will the proposal result in liquid effluent discharge?

☐ Yes x No **If yes**, please briefly describe the nature, concentrations and receiving environment.

2.8.6 If there is likely to be discharges to a watercourse or marine environment, has any analysis been done to demonstrate that the State Water Quality Management Strategy or other appropriate standards will be able to be met?

☐ Yes ☐ No **If yes**, please describe.

n/a – There will be no planned discharges to watercourses or the marine environment.

2.8.7 Will the proposal produce or result in solid wastes?

☐ Yes x No **If yes**, please briefly describe the nature, concentrations and disposal location/ method.

2.8.8 Will the proposal result in significant off-site noise emissions?

☐ Yes x No **If yes**, please briefly describe.

2.8.9 Will the development be subject to the Environmental Protection (Noise) Regulations 1997?

☐ Yes x No **If yes**, has any analysis been carried out to demonstrate that the proposal will comply with the Regulations?

Please attach the analysis.

2.8.10 Does the proposal have the potential to generate off-site, air quality impacts, dust, odour or another pollutant that may affect the amenity of residents and other "sensitive premises" such as schools and hospitals (proposals in this category may include intensive agriculture, aquaculture, marinas, mines and quarries etc.)?

☐ Yes x No **If yes**, please describe and provide the distance to residences and other "sensitive premises".

2.8.11 If the proposal has a residential component or involves "sensitive premises", is it located near a land use that may discharge a pollutant?

☐ Yes x No ☐ Not Applicable

If yes, please describe and provide the distance to the potential pollution source

2.9 Greenhouse Gas Emissions

2.9.1 Is this proposal likely to result in substantial greenhouse gas emissions (greater than 100 000 tonnes per annum of carbon dioxide equivalent emissions)?

☐ Yes x No **If yes**, please provide an estimate of the annual gross emissions in absolute and in carbon dioxide equivalent figures.

2.9.2 Further, if yes, please describe proposed measures to minimise emissions, and any sink enhancement actions proposed to offset emissions.

2.10 Contamination

2.10.1 Has the property on which the proposal is to be located been used in the past for activities which may have caused soil or groundwater contamination?

☐ Yes x No ☐ Unsure **If yes**, please describe.

2.10.2 Has any assessment been done for soil or groundwater contamination on the site?

☐ Yes x No **If yes**, please describe.

2.10.3 Has the site been registered as a contaminated site under the *Contaminated Sites Act 2003*? (on finalisation of the CS Regulations and proclamation of the CS Act)

☐ Yes x No **If yes**, please describe.

2.11 Social Surroundings

2.11.1 Is the proposal on a property which contains or is near a site of Aboriginal ethnographic or archaeological significance that may be disturbed?

x Yes ☐ No ☐ Unsure **If yes**, please describe.

See attached supporting information, Table 5-1 Environmental Factors and Potential Impacts and Management Measures and Section 6 Consultation.

A search of the Department of Aboriginal Affairs database has identified the following potential heritage assets:

1. Gnoorea Point beach crossing – Gnoorea Point artefacts scatter area.

The heritage assets identified are likely to be land based should not be impacted by a marine installation. As the beach areas will be directionally drilled, or laid through areas already disturbed, impacts to heritage assets at landfall are unlikely. Consultation has been undertaken with the relevant traditional owners (Thalanji, Yaburara and Coastal Mardudhunera).

2.11.2 Is the proposal on a property which contains or is near a site of high public interest (e.g. a major recreation area or natural scenic feature)?

☐ Yes x No **If yes**, please describe.

2.11.3 Will the proposal result in or require substantial transport of goods, which may affect the amenity of the local area?

☐ Yes x No **If yes**, please describe.

3. PROPOSED MANAGEMENT

3.1 Principles of Environmental Protection

3.1.1 Have you considered how your project gives attention to the following Principles, as set out in section 4A of the EP Act? (For information on the Principles of Environmental Protection, please see EPA Position Statement No. 7, available on the EPA website)

1. The precautionary principle.	x Yes	☐ No
2. The principle of intergenerational equity.	x Yes	☐ No
3. The principle of the conservation of biological diversity and ecological integrity.	x Yes	☐ No
4. Principles relating to improved valuation, pricing and incentive mechanisms.	x Yes	☐ No
5. The principle of waste minimisation.	x Yes	☐ No

See Section 5 of the supporting information.

3.1.2 Is the proposal consistent with the EPA's Environmental Protection Bulletins/Position Statements and Environmental Assessment Guidelines/Guidance Statements (available on the EPA website)?

x Yes ☐ No

See Section 5 of supporting information. As assessment has been made of environmental impacts against the EPA environmental factors and management objectives.

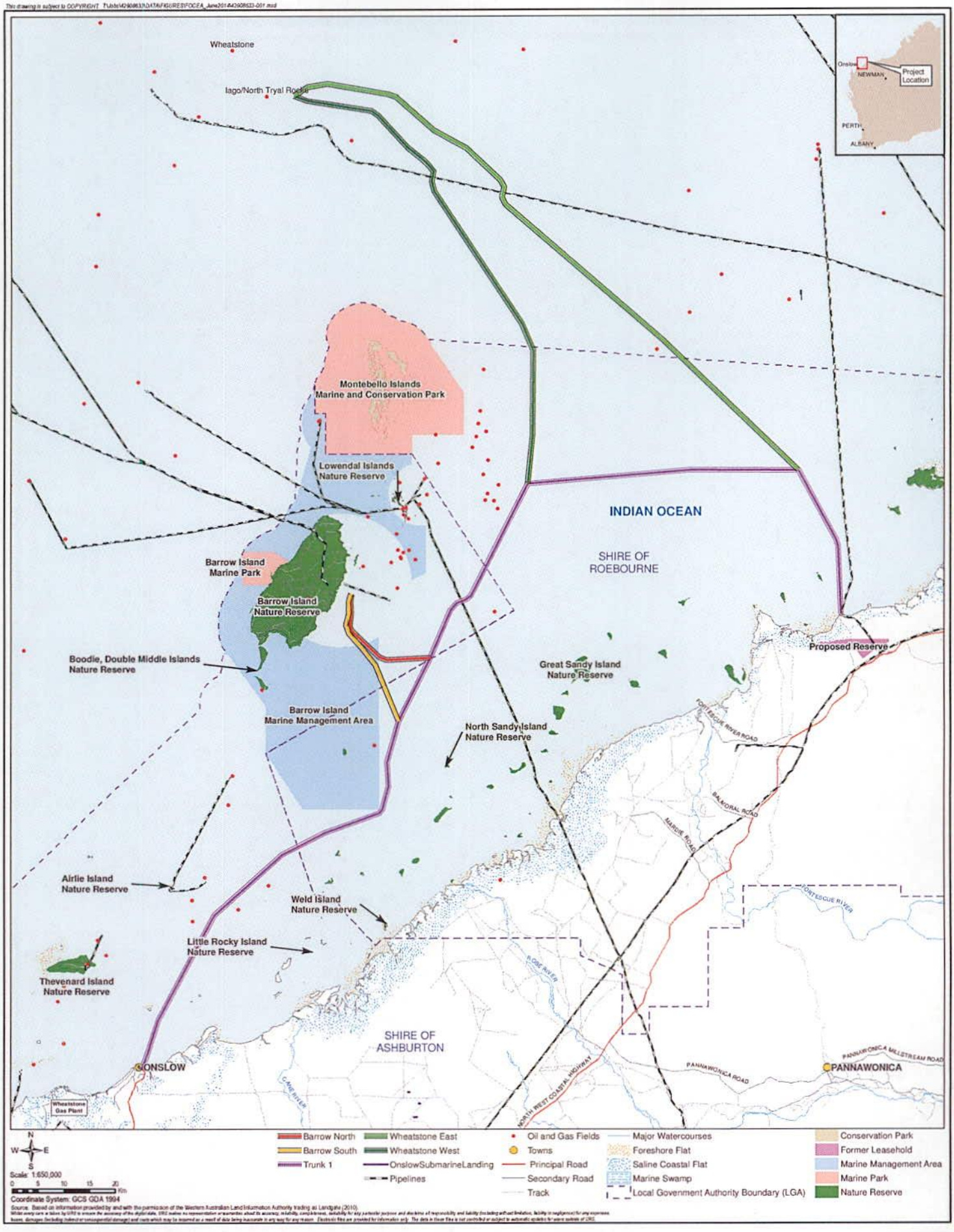
3.2 Consultation

3.2.1 Has public consultation taken place (such as with other government agencies, community groups or neighbours), or is it intended that consultation shall take place?

x Yes ☐ No **If yes**, please list those consulted and attach comments or summarise response on a separate sheet.

See attached supporting information, Section 6 Consultation.

Consultation has been undertaken with the Environmental Protection Authority, Department of the Environment and Department of Parks and Wildlife.



Source: Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).

TELSTRA CORPORATION LIMITED

PROJECT OVERVIEW

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File No: 42908633-001.mxd Drawn: RNM Approved: MJ Date: 20/06/2014

Figure: 1

Rev: A A3

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Report

Supporting Information for Referral to the Environmental Protection Authority

AUSTRALIA

Barrow Island Marine Fibre Optic Cable Installation

9 August 2014
42908633/TESG0421/0

Prepared for:
Telstra Corporation Limited

Prepared by URS Australia Pty Ltd

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DOCUMENT PRODUCTION / APPROVAL RECORD				
Issue No.	Name	Signature	Date	Position Title
Prepared by	Mike Jones		09/10/14	Senior Environmental Scientist
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Approved by	Ian Baxter		09/10/14	Principal Marine Scientist

Report Name:
Supporting Information for Referral to the Environmental Protection Authority

Sub Title:
Barrow Island Marine Fibre Optic Cable Installation

Report No.
42908633/TESG0421/0

Status:
FINAL

Client Contact Details:

Telstra Corporation Limited

DOCUMENT REVISION RECORD		
Issue No.	Date	Details of Revisions
0	09/10/14	FINAL

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ABBREVIATIONS

Abbreviation	Description
AES	Area of Environmental Significance
BPPH	Benthic Primary Producing Habitats
CAMBA	China Australian Migratory Bird Agreement
CALM	*Conservation and Land Management Act* 1984
DoE	Department of the Environment
DPAW	Department of Parks and Wildlife
EAG	Environmental Assessment Guidelines
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act* 1984
EPBC	*Environmental Protection and Biodiversity Act* 1999
HDD	Horizontal Directional Drilling
JAMBA	Japan Australia Migratory Bird Agreement
km	Kilometres
LAT	Lowest Astronomical Tide
LIFD	Telecommunications (Low Impact Facilities) Determination 1997
mm	Millimetres
OEPA	Office of the Environmental Protection Authority
RNE	Register of the National Estate
Telecoms Act	*Telecommunications Act* 1997
URS	URS Australia Pty Ltd.
WA	Western Australia

1 INTRODUCTION

Telstra Corporation Limited (Telstra) is currently undertaking the preliminary design of a terrestrial and marine fibre optic cable in the Onslow region of the Pilbara, Western Australia (WA) (the Project). The fibre optic cable consists of two segments comprising a marine segment from Onslow to Barrow Island then to the Wheatstone Gas Platform terminating at Devil Creek; and land connection at Gnoorea Point, Barrow Island Jetty and Onslow Beach.

This report is to provide information to support a referral of the marine portion of the Project to the Office of the Environmental Protection Authority (OEPA) under Part IV of the *Environmental Protection Act 1984* (EP Act). This will enable advice to be sought on the Environmental Protection Authority (EPA) views on potential impacts of the Project on key environmental factors. It should be noted that this referral is only concerned with marine aspects of the Project, and, as the Project is considered a low impact facility (as described in the *Telecommunications (Low-Impact Facilities) Determination 1997)*, terrestrial aspects are being dealt with separately by Telstra under the *Telecommunications Act 1997* (Telecoms Act).

2 PROJECT DESCRIPTION

The Project involves two key activities:

- Marine cable laying.
- Cable laying and directional drilling at land fall areas (Gnoorea Point and Onslow Beach).

2.1 Route Alignment

The marine route can be split into two sections, inside State waters and outside of State waters, as follows:

- **Submarine cable within State waters (approximately 270 kilometres (km) in length):** The cable would be laid from Onslow to Barrow Island jetty and to Gnoorea Point landing [Trunk 1 and Branch Unit (BU)1]. The cable will be directly laid on the seabed.
- **Submarine cable outside of State waters (approximately 222 km in length):** The cable would be laid from BU3 to the Wheatstone Gas Platform and from the Wheatstone Gas Platform to BU4. The cable will be directly laid on the seabed.

The route alignment for the cable is shown in Figure 1. The cable outside of State waters is not considered a matter of consideration for the EPA, and will be discussed with the Department of the Environment (DoE). Therefore the focus of this report is those areas within State waters.

2.2 Construction

2.2.1 Marine Cable Laying

Installation of the marine cable will be undertaken by a specialist contractor, International Telecom. Construction is likely to commence in the last quarter of 2015, and last for approximately 5 months, with approximately 3 km of cable laid per hour. International Telecom will utilise two vessels for the cable laying, a shallow draft vessel (Pate 2-1) for shallow depths and a deepwater vessel (Plate 2-2). Vessel specifications are included in Appendix A.

To aid the cable design, and provide baseline information, Telstra commissioned Fugro Survey Pty Ltd (Fugro) to undertake a bathymetric survey and desktop assessment of the potential cable route.

Based on the desktop study and bathymetric survey, the cable segments are generally not expected to cross any major topographic features such as scarps or deep palaeo-channels, potentially hazardous features such as gas escape craters or zones of sediment instability, or potentially problematic features such as coral reefs.

However, they are expected to cross minor features up to several metres high (and typically tens of metres wide) such as various sand bedforms (megaripples, low sand waves, sand ribbons, irregular sand drifts and accumulations), and lithified calcarenite ridges and similar irregular steps and outcrops. The cable has been routed to avoid sensitive areas and other hazards such as anchoring zones where possible.

The submarine cable will be a diameter up to 25 millimetres (mm); this includes armouring and abrasion protection (cable specifications are provided as Appendix A). The cable will be armoured and abrasion protection applied prior to installation.

Plate 2-1 shows a typical shallow water cable laying vessel and Plate 2-2 a typical deep water vessel. The cable is spooled on the vessel deck before being laid onto the seafloor (a typical cable spool on a vessel deck is shown in Plate 2-3). In shallow waters, a portion of the cable will be transferred to a 'shore end barge' (a shallow draft vessel) for laying. Burial of the cable will not be undertaken on the seafloor due to the geology and the absence of trawl fishing activity in this area. The cable is 'laid' on the sea floor, with appropriate slack management to prevent the cable being dropped.

There may be an occasional requirement to anchor the cable in place to prevent excess movement during cyclones, this involves laying concrete mattresses over the cable to reduce movement. The cable will cross a number of oil and gas pipelines; consultation will be undertaken with the pipeline operators as to their requirements for pipeline crossing. The cable will be connected to the Wheatstone Gas Platform along the sea bed via one of the supporting struts of the gas platform.

Plate 2-1 Typical Shallow Water Cable Laying Vessel

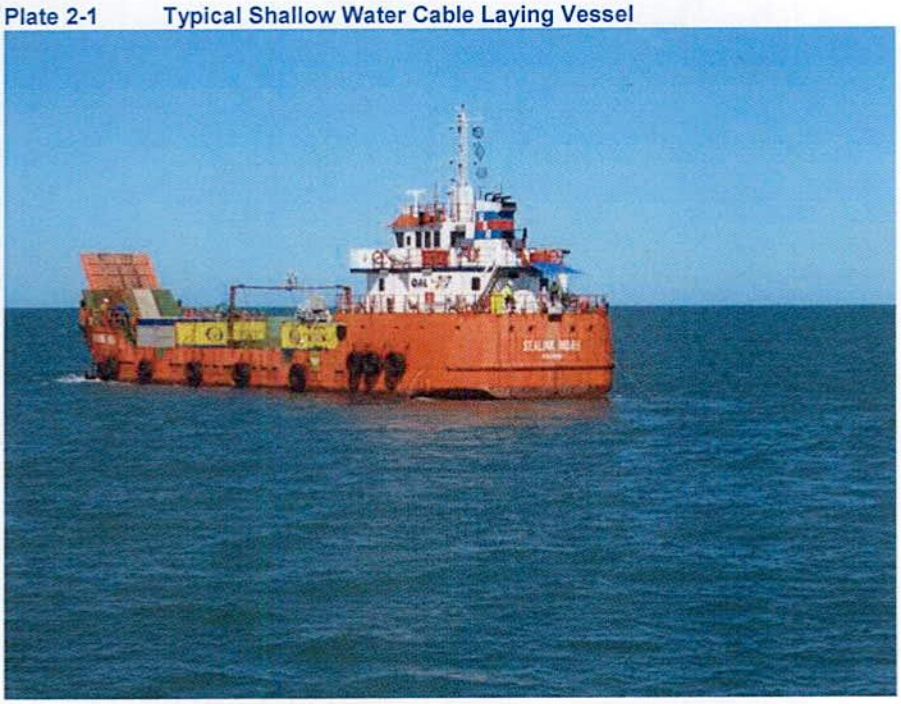
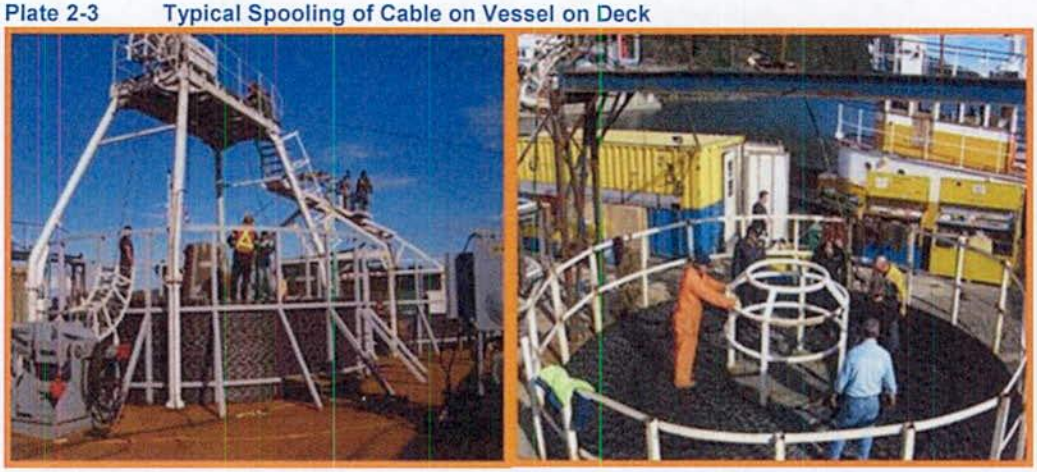


Plate 2-2 Typical Deep Water Vessel

Plate 2-3 Typical Spooling of Cable on Vessel on Deck



2.2.2 *Accuracy of Cable Laying*

The bathymetric survey was undertaken in order to identify potential obstacles along the route. The cable laying contractor will utilise integrated navigation systems to record the ships position on a 24 hour basis, with position accuracy to +/- 2 metres (m). Cable deployment will be modelled and controlled utilising specialist deployment software to ensure laying accuracy. However, for this assessment, an allowance of 5 m either side of the proposed cable alignment will be allowed to take account of any movement after the cable is laid.

2.3 Shore Connections

Beach connections will be required at the cable landfall points at Gnoorea Point and Onslow Beach. Connection onto Barrow Island will be via the existing pier, along the DomGas pipeline. The beach landings will be achieved by bringing the shallow draft vessel as close to shore as possible. Directional drilling will be undertaken from the near-shore area to an off-shore area for the cable installation.

The cable is then passed into a beach manhole then connected into the terrestrial cable. At the proposed Gnoorea Point landing area, the beach manhole would be located within the car park and the cable aligned down a boat access ramp.

Installation of the sub-marine cable will be undertaken outside of the cyclone season. Beach operations would be during the day time only.

2.3.1.1 *Horizontal Directional Drilling*

The shore end sections of the cable will require horizontal directional drilling for cable protection and to avoid environmentally sensitive shore areas. It is intended to utilise a drill and leave method, where a pilot hole is drilled horizontally from the beach manhole location to below the low water mark. Drill pipes are then left in place to form the conduit pathway for the cable infrastructure.

The drill hole will be approximately 128mm (size of drill bit), installing a 80mm conduit pipe. A non-toxic, biodegradable drilling fluid, xanthum gum, will be utilised for the drilling.

When close to the HDD end point, less drilling fluid will be utilised to minimise leakage of drilling fluid into the marine environment. Following completion of drilling and conduit connection, any excavations will be reinstated to as close to original as possible.

A construction compound will be required at each site. The site compound will utilise existing disturbed land (such as the car park at Gnoorea point) and no clearing of vegetation will be required. An environmental management plan has been prepared by Telstra for the HDD works.

2.3.1.2 *Onslow Shore Connection*

At Onslow the cable will be directionally drilled from the Onslow beach manhole to 400 m offshore (low water mark). Directional drilling will make use of an existing gap in the reef and this will enable the cable to be laid on the seabed beyond the reef. The potential HDD drill location is shown in Plate 2-4. The programme of works is likely to be:

- Site establishment and set up – 8 days.
- Complete first drill shot – 18 days.

Plate 2-4 Potential HDD End Location off Onslow Shore Connection

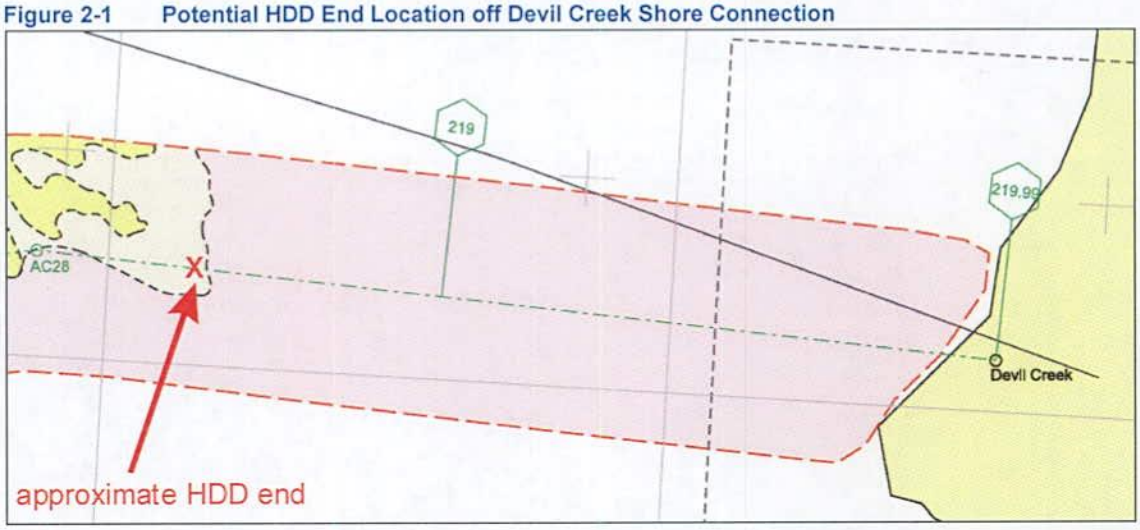
2.3.1.3 *Devil Creek Shore Connection*

For Devil Creek, two cable conduits are required for connection. HDD will be from the shore connection behind the dunes to the low water mark, approximately 805 m offshore. The depth at the low water mark is approximately 3 m. The HDD will emerge in medium to coarse, uncemented carbonate sand. This represents a total length of 1450 m. The location of the HDD bore is shown in Figure 2-1.

The programme of works is likely to be:

- Site establishment and set up – 8 days.
- Complete first drill – 43 days.
- Complete second drill – 28 days.

Figure 2-1 Potential HDD End Location off Devil Creek Shore Connection



2.4 Operations

Operation of the cable will be managed by the Proponents from their global operations centre in Melbourne.

2.5 Maintenance

Once installed, it is not expected that the cable will require any routine maintenance activity. Sufficient slack will be included when laying the cable so in the unlikely event of damage or failure; the cable can be hauled to the surface for repairs. Relevant authorities and stakeholders will be consulted if this was to occur.

2.6 Decommissioning

The life of the cable is a minimum 30 years and removal of the decommissioned cable is not considered feasible. The potential environmental impacts of retrieving and disposing of the cable are likely to outweigh the impacts of leaving the cable in place. Additionally it is likely that over time the cable will provide a structure for colonisation of habitat forming species.

3 PROJECT LEGISLATIVE BACKGROUND

The following sections provide an overview of relevant legislation concerning the Project. As this document will support a referral under the EP Act, an overview of the EP Act is not given.

3.1 Telecoms Act

The majority of the project will be undertaken under the Telecoms Act. This legislation allows a telecommunications carrier (such as Telstra) to develop certain types of infrastructure in certain areas, with exemption from State and Territory laws and exemption from planning approvals for the activity.

Schedule 3 of the Telecoms Act concerns installation of cables within State controlled areas. Schedule 3 Part 1 of the Telecoms Act authorises a carrier to install a facility without State or Territory approvals if the facility is classed as a 'low impact facility'. The Telecommunications (Low Impact Facilities) Determination 1997 (LIFD) defines a low impact facility, and specifies conditions under which a cable (amongst other types of facilities) can be defined as a low impact facility. In addition, it states that no type of telecommunications facility can be defined as a low impact facility (and therefore be exempt from State or Territory assessment and approvals) if it is within an Area of Environmental Significance (AES). An area of AES is defined within LIFD as:

1. "An area is an area of environmental significance if it is identified property for Section 3A of the World Heritage Properties Conservation Act 1983.

2. An area is an area of environmental significance if it is an identified property (within the meaning of Section 3A of the World Heritage Properties Conservation Act 1983).

3. An area is an area of environmental significance if it is a place that Australia is required to protect by the terms of a listed international agreement.

4. An area is an area of environmental significance if, under a law of the Commonwealth, a State or a Territory:

a. It is designated as a reserve for nature conservation purposes.

b. The principal purpose of the designated reserve is for nature conservation.

5. An area is an area of environmental significance if it is an area that, under a law of the Commonwealth, or a State or Territory, is protected from significant environmental disturbance.

6. An area is an area of environmental significance if it is entered in the Register of the National Estate or the Interim List for that Register.

7. An area is an area of environmental significance if, under a law of the Commonwealth, a State or a Territory, it consists of a place, building or thing that is entered in a register relating to heritage conservation.

8. An area is an area of environmental significance if, under a law of the Commonwealth, a State or a Territory, it is:

a. entered in a register; or

b. otherwise identified; as being of significance to Aboriginal persons or Torres Strait Islanders, in accordance with their traditions."

The marine cable will pass through the Barrow Island Marine Management Area which can be considered as an AES. As the majority of the cable is not in an AES then only the section of the cable within the Barrow Island Marine Management Area will require consideration by State regulators and the remainder of the Project will be undertaken under the Telecoms Act. However, in order to provide context for the Project, this report discusses potential impacts along the entire cable route within WA State waters.

3.2 Conservation and Land Management Act 1984

The proposed Project route will pass through an unzoned area of the Barrow Island Marine Management Area (the Management Area). The management plan for the Management Area (Department of Environment and Conservation [DEC] 2006) details the environmental objectives and management measures which must be followed with regards to development within the Management Area.

For unzoned areas in the Management Area, proposals for marine infrastructure are required to be assessed subject to the Western Australian *Marine Act 1982* and a licence is required from the Department for Parks and Wildlife (DEC 2006). Consultation has been undertaken with the Department for Parks and Wildlife (DPAW) as to access requirements for the Management Area, detailed in Section 6.

3.3 Environment Protection and Biodiversity Conservation Act 1999

In a search of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) database; a number of listed species were noted as potentially occurring in the Project area. Therefore, consultation has been undertaken with the Department of the Environment (DoE) and a referral under the EPBC Act is being submitted. Further details on consultation are given in Section 6.

4 ENVIRONMENTAL SETTING

4.1 Overview of Environmental Setting

The following provides an overview of the environmental setting and further detail is given in Table 5-1. Information on the environmental setting has been informed from desk based sources, bathymetric survey and benthic habitat survey undertaken along the proposed cable route.

- Marine fauna: a search of the Department of Parks and Wildlife (DPAW) website has indicated a number of listed species in the area including turtles and marine mammals. The area is also known as a migration route for a number of whale species. There have been instances of turtle nesting at Gnoorea Point.
- Benthic Communities and Habitat: there are a number of benthic primary producing habitats along the proposed route.
- From a water and sediment quality perspective, the marine environment along the cable route can be considered pristine.
- There is one identified heritage asset at Gnoorea Point.

4.2 Bathymetry

The cable route from Onslow to Barrow Island remains in shallow water – expected to be less than 16 m in depth from the Lowest Astronomical Tide (LAT). From Barrow Island to Devil Creek the seabed deepens to approximately 32 m, before shoaling again at landfall. Depths towards the Wheatstone Platform deepen to a maximum of 80 m.

4.3 Seabed Geology

Generally the geology along the proposed cable route is loose sandy sediments with some areas of flat-laying calcarenite pavement, with some areas of higher relief closer to Devil Creek. In shallower areas close to Barrow Island coral pinnacles may be present (Unpublished report: Fugro 2013). Offshore, the loose sandy sediments are thicker, with some outcropping calcarenite ridges.

4.4 Landfall Areas

The cable landfalls will be at Onslow Beach and Gnoorea Point. The Onslow Beach foreshore consists of a reef in the intertidal zone, which comprises flat-lying calcarenite with micro-algal growth. The beach has a gentle gradient and is composed of fine to medium carbonate sand, with some pebbles.

At Gnoorea Point the beach slopes at a gentle angle and comprises medium sand with pebbles, with vegetated dunes in the foreshore. Flat laying rock is present in the intertidal zone, with a 10 m access channel cleared for small boat access.

4.5 Benthic Habitats

4.5.1 Habitat survey

A drop camera survey of the proposed cable route was undertaken to confirm the findings of previous habitat studies conducted in the Project area and to determine the benthic habitats present along the proposed cable route. This was undertaken by Geo Oceans Pty Ltd in September 2014. Survey sites were selected based on the Fugro bathymetric data, focusing on areas of low to high relief and hard substrate, as these areas are more likely to support complex benthic habitat communities and habitat for significant species. A total of 49 transects (one transect per site) were surveyed, varying in length, with four transects within the Barrow Island Marine Management Area. The locations of these transects are shown in Appendix D, along with a summary of the benthic habitats found along each survey transect.

4.5.2 Onslow

Three sites were surveyed in the nearshore waters off Onslow ranging from bare sandy sediment to low profile rocky reef with a diverse range of filter feeders, including gorgonians (sea fans and whips), soft corals and sponges. Habitats comprising sparse to moderate patches of red and brown algae with sparse coverage of filter feeders were also identified (Plate 4-1); reef fish were present in these habitats.

Plate 4-1 Typical Mixed Hard Coral and Filter Feeder Communities in Nearshore Waters Off Onslow

4.5.3 Barrow Island Marine Management Area

The benthic habitats found at the four sites within the Barrow Island Marine Management Area were comprised of soft or hard substrates with sparse to moderate seagrass cover (*Halophila* spp., Plate 4-2), macroalgae and filter feeder communities (including the soft corals *Lobophytum* and *Sarcophyton*). At some of the sites the reef had moderate to patchy cover (1-20%) of red and brown algae and supported a diverse array of benthic sessile invertebrates including gorgonians (sea fans and whips), soft corals and sponges.

Plate 4-2 Sparse Seagrass was Present at Some Sites Within the Barrow Island Marine Management Area

4.5.4 *Offshore waters*

In the offshore waters near the Wheatstone platform (13 sites surveyed) the seabed was comprised mostly of sand to gravel sediments with areas of low bioturbation and sparse filter feeders and some small fish. Low profile rock reef substrate was identified at some of the survey points; this supported a sparse to moderate coverage (21-40%) of filter feeders including sponges, sea cucumbers, sea fans and sea whips.

Plate 4-3 Sparse Filter Feeders in Offshore Waters Near Wheatstone Platform

4.5.5 *Gnoorea Point*

Benthic habitats observed at three sites in the nearshore waters of Gnoorea Point ranged from bare sand and gravel sediments, to areas of low profile reef with macroalgae and filter feeders. Some reef sites supported a moderate to high cover (61-80%) of diverse filter feeders, including gorgonians (sea fans and whips), soft corals and sponges, a moderate to high cover of hard corals and a diversity of reef fish.

Plate 4-4 Diverse Benthic Habitat at a Site Near Gnoorea Point

4.5.6 *Overview*

The overall findings of the drop camera survey were consistent with the general findings of previous studies in the area. Benthic habitats were found to vary along the cable route, with seagrass and macroalgae communities occurring in shallow nearshore waters, whilst bare sand and filter feeder communities were the dominant habitats observed in deeper offshore waters. Generally, the benthic habitats and communities observed during the survey are considered well represented regionally.

5 ENVIRONMENTAL FACTORS, POTENTIAL IMPACTS AND MANAGEMENT MEASURES

A preliminary assessment has been undertaken to identify key environmental factors and potential impacts. Table 5-1 describes the potential impacts and mitigation against the environmental factors as detailed in the EPA briefing note EAG 8 (EPA 2013a). A description is given of the baseline environment and an indication is given of whether the environmental factor could be considered as key, as per the EPA briefing note EAG 9 (EPA 2013).

Table 5-1 Environmental Factors and Potential Impacts and Management Measures

Environmental Theme	Management Objective	Factor	Description of Existing Environment	Potential Impacts and Mitigation	Key Environmental Factor?
Marine Fauna	To maintain the diversity, geographic distribution and viability of fauna at the species and population levels.	Conservation Areas	Eight km of the proposed cable traverses through the Barrow Island Marine Management Area (a State marine reserve). There are a number of other marine protected areas listed on the Register of the National Estate (RNE)[1] within the vicinity of the proposed cable route including: • Montebello Islands Marine Area. • Lowendal Islands and Adjacent Marine Areas. • Coastal Islands Mary Anne to Regnard. These reserves are not expected to be impacted by activities associated with this Project. The conservation areas are shown on Figure 1.	The portions of the Barrow Island Marine Management Area crossed by the proposed cable route are 'Unzoned Areas' which currently allow most commercial and recreational activities. The Barrow Island Management Plan (DEC 2006) states that 'an assessment is required by the EPA or DEC (now DPAW) for 'proposal[s] for marine infrastructure'.	Yes. The Project crosses through the Barrow Island Marine Management Area. However, this may be controlled via a licence under the *Conservation and Land Management Act 1984* Section 101. Consultation has been undertaken with the DPAW as to obtaining a licence and an environmental management plan will be produced to control potential impacts in the conservation area.

[1] The RNE was closed in 2007 and is no longer a statutory list (Department of the Environment 2014) and the existence of an entry for a place in the RNE does not in itself create a requirement to protect the place under Commonwealth law. Nevertheless, information in the register may continue to be current and may be relevant to statutory decisions about protection.

Environmental Theme	Management Objective	Factor	Description of Existing Environment	Potential Impacts and Mitigation	Key Environmental Factor?
		DPAW Listed Species	DPAW Listed Species A DPAW Naturemap database search (Appendix B) identified four species considered Rare or likely to become extinct (Loggerhead Turtle, Green Turtle, Leatherback Turtle and Flatback Turtle), seven species protected under international agreements (JAMBA/CAMBA etc.) (migratory birds) and one Priority 4 species (Indo-pacific Humpbacked Dolphin) that may occur within the Project Area. The area is also known as a migration route for a number of whale species, including Humpback Whales, which are listed as vulnerable under the Wildlife and Conservation Act 1950 (WC Act) Schedule 1 (rare or likely to become extinct). Dugongs are known in the area, and are listed under schedule 4 of the WC Act No Threatened Ecological Communities were identified during the database search. Apache Energy carried out a survey of the beaches near Gnoorea Point (for the Devil Creek horizontal direction drilling (HDD) crossing). Turtle nesting activity was observed on eastern beaches some distance from the crossing.	Impacts to species can be from light, noise, vessel strikes and sediment which may be stirred up from the construction methodology. Listed species may utilise the beach nearshore environment where the proposed cable landfall may occur. Construction at the beach crossings will be undertaken over a short period of time, limiting the potential for light, noise and vessel strike impacts. HDD drill will be utilised to avoid impacts to near shore environments. While Telstra has advised that no nearshore night works will take place, consideration will be given to vessel light sources during mooring and to onshore lighting at the shore crossings. Any lighting impacts are likely to be minimal. Shipboard lighting for 24 hour operations will not be directed at the water surface. Sediment impacts will be limited to directional drilling for shore crossings. These will be limited to the construction period and will be minor in nature. As turtles can live in turbid environments, they are unlikely to be directly impacted by disturbance to sediment. Potential indirect impacts could occur from sedimentation of turtle food sources (filter feeders, macroalgae, seagrasses, etc.). However, the impact footprint would be minuscule compared to the areas of similar habitat within the region, hence there would be negligible risk of significant impacts upon turtle populations. The cable laying vessel will run at approximately 2 knots reducing risks to marine mammals from vessel strikes.	No. Potential impacts to DPAW listed species are considered to be limited and short term.
		Biosecurity	The WA Department of Fisheries is the responsible agency for marine biosecurity in WA State waters. Department of Fisheries maintains the WA Prevention List for Introduced Marine Pests. Any suspected occurrences on this list must be reported to WA Fisheries.	Telstra will develop marine pest management plans to satisfy quarantine legislation relevant to construction activities, including project vessels. Depending on the distance of the cable end point to Barrow Island, there may also be Chevron specific quarantine standards for operating a vessel within Barrow Island waters that will need to be adhered to.	No. Can be adequately managed through appropriate management plans.
People	To ensure that historical and cultural associations are not adversely affected.	Heritage	A search of the Department of Aboriginal Affairs database has identified the following potential heritage assets: 1. Gnoorea Point beach crossing – Gnoorea Point artefacts scatter area.	The heritage assets identified are likely to be land based and should not be impacted by a marine installation. As the beach areas will be directionally drilled, or laid through areas already disturbed, impacts to heritage assets at landfall are unlikely. Telstra are undertaking consultations with traditional owners, which is detailed in Section 6.	No.

Environmental Theme	Management Objective	Factor	Description of Existing Environment	Potential Impacts and Mitigation	Key Environmental Factor?
	To ensure that impacts to amenity are reduced as low as reasonably practicable.	Amenity	The beach landfall areas could be considered as potential amenity areas. The landfall at Gnoorea Point is close to a camping area.	As the fibre optic cable is small in size and will be directionally drilled and buried at the beach crossing areas impacts to amenity areas are unlikely	No.
Benthic Communities and Habitat	To maintain the structure, function diversity, distribution and viability of benthic communities and habitat at local and regional scales.	n/a	To identify where sensitive benthic habitats may exist along the proposed cable route, a review of existing and available information was undertaken. A geophysical survey was undertaken along the entire cable route to identify the most viable cable route option. The bathymetric data collected in this survey were reviewed to find areas that may potentially support BPPH; these areas comprise low to high relief hard substrate. There were many potential BPPH areas along the cable route. Following the survey a review was undertaken of data from benthic habitat surveys conducted within the vicinity of the proposed cable route, to further characterise these areas in terms of their likely habitat composition. Some of the surveys reviewed included the Gorgon DomGas habitat survey and the Wheatstone platform deep water habitat survey. Habitat mapping undertaken for the Wheatstone Project (Chevron, 2010) indicates that Benthic Primary Producer Habitat (BPPH) exists in the nearshore marine environment around Onslow. Small areas of hard coral have been identified while the presence of subtidal pavement habitats may indicate the presence of other BPPH communities. According to Chevron (2010), areas in deep waters impacted by the Wheatstone Project trunkline installation have been assessed and found to comprise sparse benthic assemblages, likely due to restricted light. Communities found to exist in these areas included offshore pavements and soft substrates characterised by red microalgae mats, low profile reefs with sponge gardens (generally in depths < 40 m), flat to micro- rippled substrate and silt substrates with sparse to abundant bioturbation (evidence of infauna) and trace to very sparse sessile and motile invertebrates (soft corals, sea pens, sponges, sea whips, ascidians, urchins and hydroids). Chevron (2010) concluded that there was no evidence of unique, sensitive or threatened benthic sessile communities and habitats are well represented regionally. Apache Energy (2011) has undertaken habitat mapping of the area around Devils Creek. Five BPPH categories were identified: mangrove, bare dominant, macroalgae dominant, seagrass dominant, and coral. Apache Energy (2011) indicated that the BPPH observed in their habitat survey of the proposed Reindeer Platform pipeline was typical for the region in the intertidal and nearshore and was widely represented along the coastline. BPPH comprised coral reefs, limestone pavement with macroalage, seagrass, mud and sandflats and mangroves. Further offshore along the proposed Apache pipeline, the benthic habitat ranged from isolated coral bomboras and coral patch reef dominated by macroalgae close to shore, to bare coarse sandy substrate at the seaward end of the pipeline route. Patches of seagrass and limestone pavement, with macroalgae and minor filter feeding communities, were also identified at several locations along the pipeline route amongst the predominantly bare sandy substrate. While this pipeline is located to the east of the proposed cable route under consideration for this Project, it indicates that subtidal benthic habitats are likely to be patchily distributed along the length of the cable route with some BPPH to be expected on hard substrate areas amongst the sand bottom. This has been confirmed from a benthic habitat survey undertaken by Geo Oceans in September 2014. Given the review of the Fugro bathymetric data along the proposed cable route and the existing surveys, it is anticipated that the benthic habitats present are not unique and are well represented regionally.	Reduction in the quantity or quality of BPPH has the potential to impact marine fauna food sources, recreational fishing values, commercial fishing resources and the general diversity and health of the marine ecosystem. HDD will be undertaken at the shore crossings to reduce the risk of environmental impacts. A non-toxic, biodegradable drilling fluid, xanthum gum, will be utilised for the drilling. When close to the HDD end point, less drilling fluid will be utilised to minimise leakage of drilling fluid into the marine environment. Direct impact to BPPH may result during placement of the cable and other supporting infrastructure on to the sea floor. However the project footprint is small in scale (relative to the area extent of similar BPPH in the region) and the Project activities will be of short duration in each location. Hence it is highly unlikely that Project activities will result in significant impacts to sensitive benthic communities and habitats.	Yes. However, impacts to BPPH will be limited due to the small impact area of the cable. Directional drilling will be undertaken at shore crossings to further reduce the potential for impacts.

Environmental Theme	Management Objective	Factor	Description of Existing Environment	Potential Impacts and Mitigation	Key Environmental Factor?
Marine Environmental Quality	To maintain the quality of water, sediment and biota so that the environmental values, both ecological and social, are protected.	n/a	From a water, sediment and biota quality perspective, the marine environment along the cable route can be considered pristine. There have been minimal substantial anthropogenic disturbances along the route.	Impacts will be minor in nature and limited to the construction period. Management plans will be put in place to limit vessel discharges. There may be impacts to water quality associated with the HDD beach crossings, including localised increases in suspended sediments, and addition of drilling fluid and cuttings. A non-toxic, biodegradable drilling fluid, xanthum gum, will be utilised for the drilling. Also any discharges (planned or unplanned) from vessels may have a localised impact to water quality. Discharges will be properly managed, therefore they are unlikely to have a detrimental effect on marine habitats or listed species. A management plan will be put in place to manage discharges.	No.

6 CONSULTATION

Consultation has been undertaken with a number of regulatory authorities, and is detailed below. Minutes from the consultation meetings are included in Appendix B.

6.1 Department of the Environment

A teleconference was undertaken between URS, Telstra and officers of the DoE on 3 July 2014. The details of the Project were presented and a discussion held on the level of baseline information. The DoE did not envisaged significant impacts to occur from the Project and detailed that further baseline studies may be required. The DoE recommended that a referral under the EPBC Act should be made.

6.2 Office of the Environmental Protection Authority

A meeting was held with the Office of the Environmental Protection Authority (OEPA), URS and Telstra on 1 July 2014. Officers attending from the OEPA were Hans Jacob and Anthony Sutton. The details of the Project were presented, including a guidance note, and a discussion held on potential impacts, baseline information and potential level of assessment. The OEPA did not envisage significant impacts to occur from the Project, and recommended that a referral under Part IV of the EP Act be made. The OEPA recommended that the information in the guidance note to be included with the referral as supporting information.

6.3 Department of Parks and Wildlife

A meeting was held between representatives of DPAW, URS and Telstra on 2 July 2014. The details of the Project were presented, including a guidance note with supporting information. DPAW detailed a number of items for consideration, including:

1 A marine drop camera survey may be required with the Barrow Island Marine Management Area.
2 A licence under Section 101 of the CALM Act will be required to construct and operate the Project.
3 A draft Environmental Management Plan will be required to support the application for a licence under Section 101 of the CALM Act.

The relevant management objectives detailed in the Management Plan (DEC 2006) are given in Table 6-1, and an indication is made whether the potential impacts detailed in Table 5-1 will meet these objectives.

6.4 Local Government

6.4.1 Ashburton and Roebourne Shire

The Ashburton and Roebourne Shire have been contacted as to the shore end locations for the fibre optic cable. Telstra were informed that a foreshore development was planned for Onslow, therefore Telstra have investigated alternative routes for the onshore cable.

No issues were raised for the Devils Creek onshore cable, besides a discussion around the camping ground.

6.5 Aboriginal Heritage

6.5.1 Thalanji Traditional Owners

Telstra contacted a representative of the Thalanji Traditional Owners in January 2014 to undertake further consultations and heritage surveys prior to construction for the Onslow shore connection.

6.5.2 Yaburara and Coastal Mardudhunera Aboriginal Corporation

Telstra have entered into a Deed of Heritage Agreement on 20 February 2014 with the Yaburara and Coastal Mardudhunera People, informing them of works to be undertaken on their land and laying out the requirements to be undertaken by Telstra to undertake the works on their land.

6.6 Pipeline Crossings

Telstra have undertaken consultation with a number of energy pipeline operators in the area with regards establishing Pipeline Crossing Agreements. This includes the following:

1. Apache Corporation.
2. Woodside Energy.
3. Chevron Australia.

Currently no objections have been raised during the consultation process with regards to the proposed cable route.

Table 6-1 Barrow Island Marine Management Area Objectives

Value	Environmental Aspect	Management Objective	Target	Impact and management	Project Meets Objective?
Ecological	Geomorphology	1. To ensure the structural complexity of the reserve geomorphology is not significantly reduced by installation of pipelines, or infrastructure development. 2. To ensure coastal land forms within the reserve are not significantly degraded by installation of pipelines, or infrastructure development.	Maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.	The cable will have no impact on geomorphology due to its small size. It will not impinge upon coastal land forms in the Marine Management Area. The cable will be HDD in near shore environments to prevent impacts.	Yes
	Sediment Quality	To facilitate long-term management by accumulating spatial and temporal information about impacts on sediment quality from various activities in the reserve.	Maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.	Sediment quality in the reserve could only be impacted by vessel discharges, which will be managed under appropriate management plans.	Yes
	Water Quality	To facilitate long-term management by accumulating spatial and temporal information on impacts on water quality of various activities in the reserve.	Maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.	Water quality impacts could result from vessel activities. Appropriate management plans will be put in place to manage the risk of impacts.	Yes

Value	Environmental Aspect	Management Objective	Target	Impact and management	Project Meets Objective?
Ecological	Coral reef communities	To ensure coral reef communities are not significantly impacted by accidental spillage of petroleum products or physical disturbance from development activities.	1. No loss of coral reef community diversity as a result of human activity in the reserves. 2. Maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.	The cable will be laid so as to avoid direct interaction with coral reef communities. Water quality impacts could result from vessel activities. Appropriate management plans will be put in place to manage the risk of impacts. The impacts from cable laying are likely to be minor in nature and restricted to a small area. No seabed disturbing activities are planned for this project.	Yes
	Macro-algal and seagrass communities	To gain an increased understanding of the macro-algal and seagrass communities in the reserve to facilitate long-term management.	1. No loss of macro-algal and seagrass community diversity as a result of human activity in the reserves. 2. Maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.	The impacts from cable laying are likely to be minor in nature and restricted to a small area. No seabed disturbing activities are planned for this project.	Yes

Value	Environmental Aspect	Management Objective	Target	Impact and management	Project Meets Objective?
Ecological	Sub-tidal soft-bottom communities	To ensure that sub-tidal soft-bottom communities are not significantly impacted by physical disturbance in the reserve.	1. No loss of sub-tidal soft-bottom community diversity as a result of human activity in the reserves. 2. Maintained in a natural state, except for areas where some level of acceptable change is approved by the appropriate government regulatory authority.	The impacts from cable laying are likely to be minor in nature and will be restricted to the small area beneath the cable. In areas of unconsolidated sediment, the cable will replace a small area of soft-bottom habitat with a hard substrate. No seabed disturbing activities are planned for this project.	Yes
	Marine mammals	To gain an increased understanding of marine mammals in the reserve to facilitate long-term management.	1. No loss of marine mammal diversity as a result of human activity in the reserves. 2. No loss in marine mammal abundance as a result of human activity in the reserves.	There may be a risk of intermittent localised disturbances to marine mammals from vessel activities during construction. Appropriate management plans will be put in place to reduce risk to marine mammals.	Yes
	Turtles	To ensure no loss of species diversity and abundance of turtles in the reserves, particularly in relation to the potential impacts of lights and flares on hatchlings.	1. No loss of turtle diversity as a result of human activity in the reserve. 2. No loss of turtle abundance as a result of human activity in the reserve.	There may be a risk of intermittent localised disturbances to marine turtles from vessel activities during construction. Appropriate management plans will be put in place to reduce risk to marine fauna.	Yes

Value	Environmental Aspect	Management Objective	Target	Impact and management	Project Meets Objective?
Ecological	Finfish and invertebrates	To gain an increased understanding of the finfish and invertebrate diversity and abundance throughout the reserves to facilitate long-term management.	1. No loss of finfish or invertebrate diversity as a result of human activity in the reserve. 2. No loss in protected finfish or invertebrate species abundance as a result of human activity in the reserves. 3. Abundance and size composition of finfish and invertebrate species in sanctuary zones of the marine parks to be at natural levels. 4. Management targets for abundance of targeted finfish and invertebrate species in all other areas to be determined in consultation with Department of Fisheries and peak bodies.	There are no seabed disturbing activities planned. Hence the only invertebrate communities potentially impacted would be those directly beneath the cable when it is laid. It is unlikely that finfish would be impacted by the project; however there will be minor alteration of demersal fish habitat resulting from the placement of the cable. In areas of unconsolidated sediment, the cable will replace a small area of this habitat with a hard substrate that will most likely be colonised by a different suite of invertebrate species to those currently present. Management plans will be put in place to reduce the risk of impacts occurring outside of the planned cable corridor.	Yes

7 CONCLUSION

As the majority of the proposed cable route is not within an AES and therefore can be carried out under the Telecoms Act; this would preclude assessment under State laws and planning approvals. The exception to this is where the Project crosses into the Barrow Island Marine Management Area (considered an AES). Therefore it is understood that consideration by the EPA will be limited to the section of the Project which crosses the Barrow Island Marine Management Area.

The potential impacts of the Project have been compared against the EPA's objectives and the Barrow Island Marine Reserve objectives. As detailed in EAG 9 (EPA 2013a) the EPA will only consider key environmental factors in any assessment.

For the Project, it is considered that benthic communities and habitats and conservation areas can be considered the only relevant key environmental factor. Potential impacts to benthic communities and habitats would be managed through appropriate management plans, and under licences required by the DPAW to undertake work in marine reserves. It is understood that this would provide an alternative regulatory process to EPA assessment, and would obviate the need for EPA assessment.

8 REFERENCES

- Apache Energy 2011. Devil Creek Development Project Operations Environment Plan: Summary November 2011.
- Chevron 2010. Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project July 2010. Technical Appendices N3 to N10.
- Department of Environment and Conservation (DEC)/ Marine Parks and Reserve Authority (MPRA). 2006. Management Plan for the Montebello/Barrow Islands Marine Conservation Reserves. 2007 – 2017. Management Plan No. 55.
- Department of the Environment 2014. Register of the National Estate – archive. www.environment .gov.au/topics/heritage/heritage-places/register-national-estate. Viewed 26 June 2014.
- Environmental Protection Authority. 2013. Environmental Assessment Guideline 8. Environmental Assessment Guideline for Environmental factors and objectives.
- Environmental Protection Authority. 2013a. Environmental Assessment Guideline 9. Environmental Assessment Guideline for Application of a significance framework in the environmental impact assessment process. Focusing on the key environmental factors.
- Unpublished report: Fugro. 2013. Report on Marine Route Survey for the Barrow Island Fibre Optic Cable System. GP1466

9 LIMITATIONS

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Telstra Corporation Limited and only those third parties who have been authorised in writing by URS to rely on this Report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this Report.

It is prepared in accordance with the scope of work and for the purpose outlined in the contract dated 19/05/14.

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

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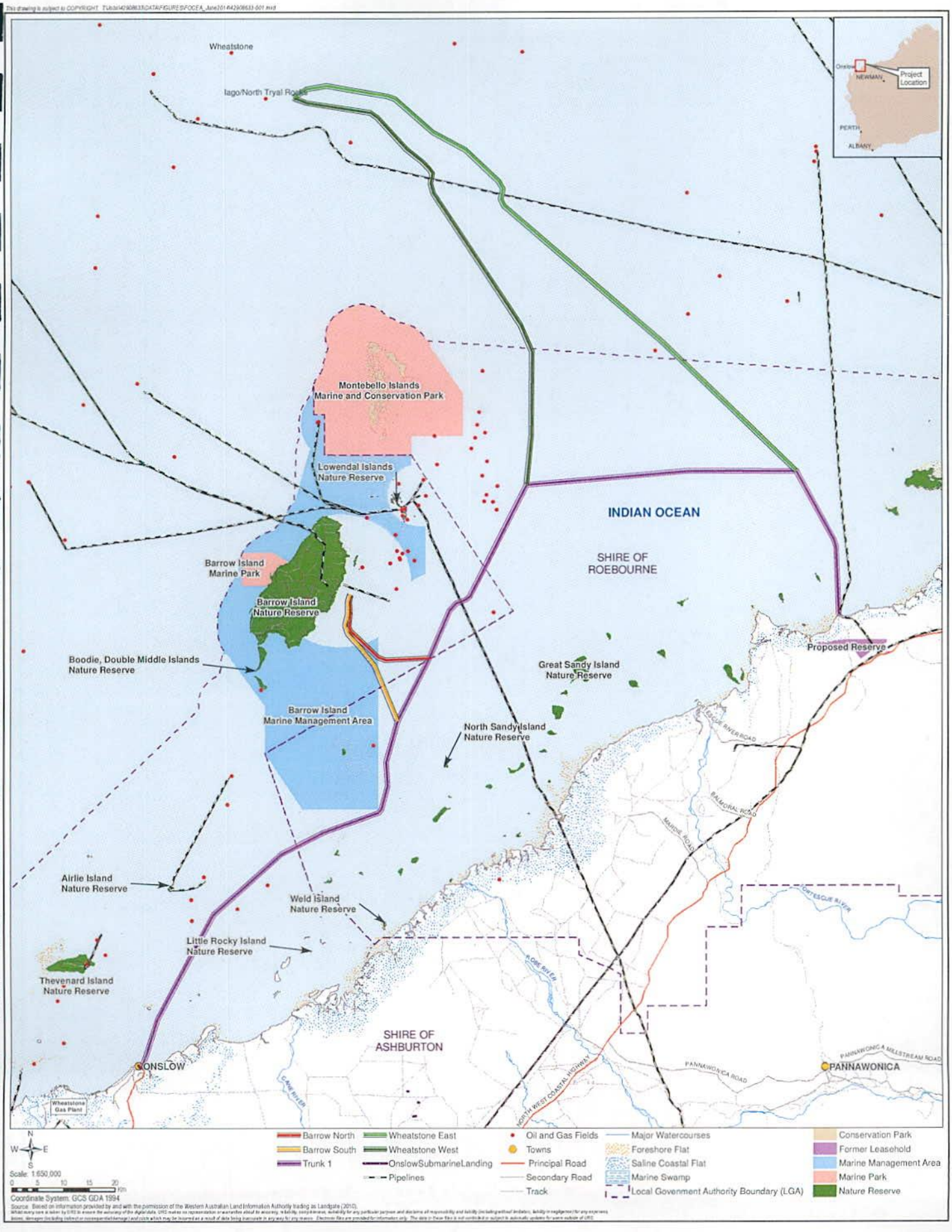
FIGURES



TELSTRA CORPORATION LIMITED

PROJECT OVERVIEW

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APPENDIX A CABLE AND VESSEL SPECIFICATION

IT Intrepid

Specifications:

DIMENSIONS

Length Overall	115.0m
Breadth Moulded	18.0m
Depth Moulded	10.1m
Max Draught	6.3m
Gross Tonnage	6141t
Port of registry	Barbados

THRUSTERS

Bow Thruster	1 x White Gill 750kW
Stern Thruster	1 x White Gill 750kW

ACCOMMODATION

Officers and Crew	76
Passengers	11
Total Berths	87

A-FRAME

Certification	ABS
SWL	25t
Weight	45t

IT PLOW

Weight	17t
Burial Depth	1.2m
Burial speed	0.6-1km/h
Bending Radius	1.5m

CLASSIFICATION

ABS, A1, AMS, ACCU

(Previously LR Ice Class 3)

DYNAMIC POSITIONING

Cegelec 900 Series

POWER AND PROPULSION

2 x Main engines at 2,200kW

2 x Auxiliary engines at 750kW

2 x Propulsion Motors at 2,000kW

CABLE MACHINERY

2 x 3.5m dia. CDE, 40t max pulling capacity

18 wheel pair LCE, 18t max pulling capacity

1 x 1 wheel pair transporter

EMERGENCY GENERATORS

1 x 350kW Caterpillar diesel

CRANES/LIFTING CAPACITIES

Bow Gantry	1 x 5t bow hoist
FWD PORT	3t at 16mt
AFT STBD	3t at 16m

ROV CRANE

CAPACITY (Max)

2 x Main Tanks, 1 x Spare

Cable Load Capacity	1700t
Cable Volume	1232m3
Repeaters Capacity	45

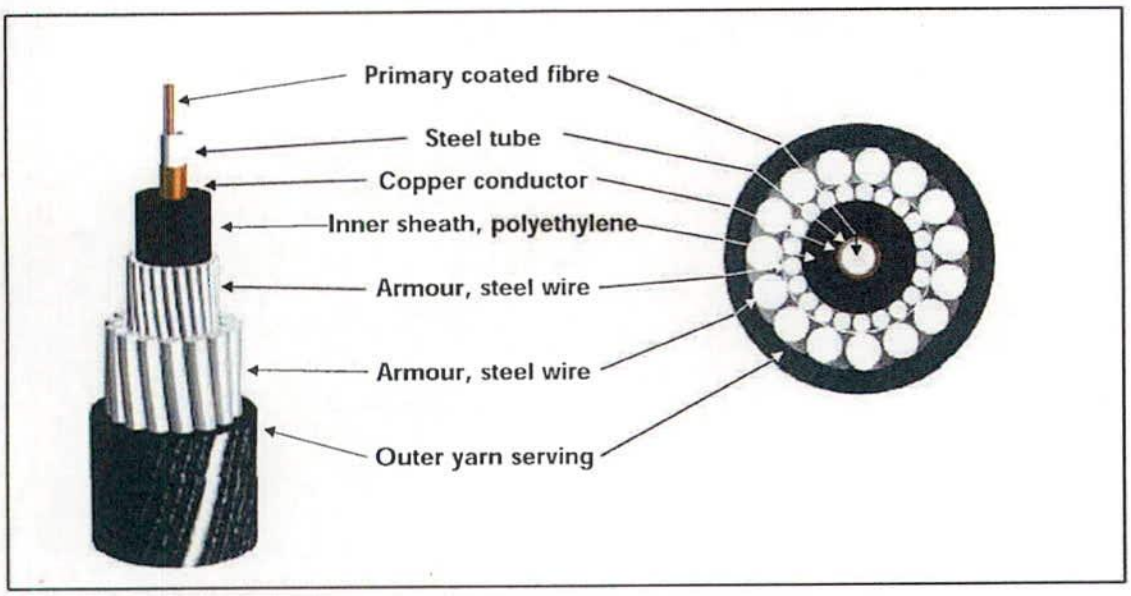
SPEED/ENDURANCE

Maximum Speed	14 Knots
Cruising Speed	12 Knots

Endurance 42 days @ 12 Knots

IT EXPLORER ROV

Operating Dept	Up to 2000m
Power	160hP
Max Payload	50kg
Max Operation Sea State	6
Burial	0.8m



Cable Characteristics	Unit	Value
Cable Outer Diameter	mm	24.5
Steel wires in the 1st layer		18 x 1.9mm
Lay length for the 1st layer	mm	260
Steel wires in the 2nd layer		16 x 3.2 mm
Lay length for the 2nd layer	mm	350
Cable Weight in Air	kg/m	1.9
Cable Weight in Water	kg/m	1.3
Maximum Deployment Ocean Depth[1)]	m	3000
Minimum Breaking Load (UTS)	kN	200
Nominal Transient Tensile Strength (NTTS)	kN	150
Nominal Operating Tensile Strength (NOTS)	kN	80
Nominal Permanent Tensile Strength (NPTS)	kN	50
Modulus	km	15.5
Hydrodynamic Constant	degree x knot	100
Minimum Bending Radius under Tension	m	0.75
Minimum Bending Radius under no Tension	m	0.50
Operating Temperature Range	°C	-10 to +35
Storage Temperature Range	°C	-30 to +60
Crush Resistance (IEC 794-1-E3)	kN	15
Impact Resistance (IEC 794-1-E4)	Nm	400

[1)] Maximum 1500 m with 5.6 mm OD central tube

Table 2.6 DOUBLE ARMOURED CABLE (DA 1)

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APPENDIX B CONSULTATION MEETING MINUTES

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Telstra Fibre Optic Cable

MEETING MINUTES

Meeting Number		Project Number	
	1		42908633

Title of meeting	Date	Time
Consultation with OEPA (Office of Environmental Protection Authority)	1/7/2014	2:00 pm

Location

168 St Georges Terrace

Attendees

Hans Jacob (OEPA), Anthony Sutton (OEPA), John Hirst (Telstra), Harshita Chopra (Telstra), Mike Hall (Telstra) Ian Baxter (URS), Arnica Di Lollo (URS)

FYI (BCC)

Michael Jones (URS)

Item	Discussion	Action
1	A project briefing note was provided to OEPA prior to the meeting. The proposed Telstra fibre optic cable passes through Barrow Island Marine Reserve, an area of environmental significance (AES) which will not be covered under the Telecoms Act.	
2	The project was discussed, with Telstra providing more information to OEPA around the beach crossings and how these will be undertaken.	
3	OEPA's advice was to refer the project. This will prevent any third party referral that may occur in the future, which may have implications for the project schedule.	
4	There are a number of fisheries in the project area e.g. the Prawn Fishery, OEPA suggest that a level of community consultation will be required.	
5	OEPA was happy with the level of information provided in the briefing note and advised that the information provided in the briefing note should be adequate for the referral (just needs to be repackaged) with the suggestion that more information be included on how potential impact has been minimised through the proposed beach crossing method (HDD). A referral form will also be required to be prepared to accompany the briefing note.	URS to complete referral form and repackage information
6	OEPA will seek advice from DPaW that they can adequately control and regulate through control of the marine reserve.	
7	OEPA suggested that they are unlikely to formally assess this project as the scale and magnitude is so minor.	

8	Expected timeframe: Once the referral form and supporting documentation (briefing note) has been submitted to the OEPA, there will be a 7 day public comment period. Following this, the EPA will provide a decision within 28 days. During the 28 day period the OEPA will consult with DPaW to determine whether the potential impacts of the project can be managed adequately through licences and management plans administered under the *Conservation and Land Management Act 1984* (CALM Act).	
9	When submitting the referral, the OEPA suggested that we provide some context to the project in a covering letter. The letter may include information describing the magnitude of the project that the cable will be placed on top, not trenched and is of small scale.	
10	URS to provide OEPA with details of the DPaW contact for this project.	URS

URS

Telstra Fibre Optic Cable

MEETING MINUTES

Meeting Number	1	Project Number	42908633

Title of meeting | **Date** | **Time**

Consultation with DPaW (Department of Parks and Wildlife) | 2/7/2014 | 2:00 pm

Location

DEC Technology Park, Kensington WA

Attendees

Hayley Bain (DPaW), Sue (DPaW), John Hirst (Telstra), Harshita Chopra (Telstra), Russel Pinto (Telstra), Mike Hall (Telstra) Ian Baxter (URS), Arnica Di Lollo (URS)

FYI (BCC)

Michael Jones (URS)

Item	Discussion	Action
1	A project briefing note was provided to DPaW prior to the meeting. The proposed Telstra fibre optic cable passes through Barrow Island Marine Reserve, an area of environmental significance (AES) which will not be covered under the Telecoms Act.	
2	The project was discussed; DPaW was particularly interested in the use of concrete mattresses for stabilisation of the cable.	
3	DPaW advised that an Environmental Management Plan will be required to demonstrate that project risks can be managed adequately. The management plan should include more information on marine fauna in the area and benthic habitat along the fibre optic route. DPaW want more details on the project, for instance how fast the vessel will be travelling during cable laying?	
4	DPaW confirmed that a drop camera survey will be required to ground-truth the benthic habitat present along the cable route.	
5	A permit under the *Conservation and Land Management Act 1984* (CALM Act) will be required to undertake a drop camera survey within the marine reserve.	URS to investigate
6	Regulation 4 – CALM Act – authorisation to undertaken works in marine reserve.	URS to investigate
7	The Marine Parks and Reserves Authority (MPRA) may be interested in the project. Once DPaW has reviewed the project, they will write a recommendation and provide it to MPRA.	
8	DPaW raised the question whether cable laying is a prescribed premises under the EP Act.	URS to investigate
9	The Project must be referred to the EPA first, but the process with DPaW can be undertaken in parallel (e.g. drafting the EMP).	

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APPENDIX C DPAW DATABASE SEARCH

MARINE FAUNA LISTING

Common Name	Conservation Status		
	State		Cwlth
	Wildlife Conservation Act	DPaW	
Mammals			
Humpback whale	Schedule 1	-	Vulnerable/Migratory
Short-finned pilot	-	-	Cetacean
Orca	-	-	Migratory/Cetacean
Minke whale	-	-	Cetacean
Bryde's whale	-	-	Migratory/Cetacean
Sei whale	Schedule 1	-	Endangered/Migratory/ Cetacean
Pygmy blue whale	-	-	Migratory/Cetacean
Fin whale	Schedule 1	-	Vulnerable/Migratory/ Cetacean
Melon headed whale	-	-	Cetacean
Sperm whale	-	Priority 4	Migratory/Cetacean
Dugong	Schedule 4	-	Migratory
Blue whale	Schedule 1	-	Endangered/Migratory
Southern right whale	-	-	Endangered/Migratory
Indo-pacific humpback dolphin	-	Priority 4	Cetacean
Bottlenose dolphin	-	-	Cetacean
Spotted dolphin	-	-	Cetacean
Indian ocean bottlenose dolphin	-	-	Cetacean
Marine Reptiles			
Loggerhead turtle	Schedule 1	-	Endangered/ Migratory/Marine reptile
Green turtle		-	Vulnerable/Migratory/Marine reptile

Common Name	Conservation Status		
	State		Cwlth
	Wildlife Conservation Act	DPaW	
Leatherback turtle		-	Vulnerable/Migratory/Marine reptile
Flatback turtle		-	Vulnerable/Migratory/Marine reptile
Hawksbill turtle		-	Vulnerable/Migratory/Marine
Birds			
Eastern teef egret	International Agreement	-	-
Ruddy turnstone		-	-
White bellied sea eagle		-	-
Lesser crested tern		-	-
Caspian tern		-	-
Roseate tern		-	-
Southern giant petrel	International Agreement	-	Migratory
Wedge tailed shearwater	Schedule 3	-	Migratory
Fish			
Whaleshark	-	-	Vulnerable/Migratory
Dwarf sawfish	Schedule 1	-	Vulnerable
Grey nurse shark	Schedule 1	-	Vulnerable
Great white shark	Schedule 1	-	Vulnerable/Migratory
Shortfin mako	-	-	Migratory
Longfin mako	-	-	Migratory
Giant manta ray	-	-	Migratory
Green sawfish	Schedule 1	-	Vulnerable

A.1 Explanation of Listing

A.1.1 Wildlife Conservation Act 1950

- Schedule 1: Fauna that is rare or is likely to become extinct
- Schedule 3: Migratory Birds protected under an international agreement
- Schedule 4: Other specially protected fauna

A.1.2 DPaW Current Threatened and Priority Fauna Ranking

Priority 4: (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

A.1.3 Commonwealth (Cwlth) EPBC Act Listed Species

- **Vulnerable:** A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
  - it is not critically endangered or endangered.
  - it is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.

Endangered: A native species is eligible to be included in the endangered category at a particular time if, at that time:

- it is not critically endangered.
- it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Migratory: Migratory species listed under international agreements to which Australia is a party are protected under the Australian Government's central piece of environmental legislation, the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). This includes:

- Bilateral migratory bird agreements - (JAMBA, CAMBA and ROKAMBA).
- Convention on the Conservation of Migratory Species of Wild Animals - (Bonn Convention).
- Ramsar Convention on Wetlands.
- Agreement on the Conservation of Albatrosses and Petrels (ACAP).

- **Cetaceans:** Under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) all cetaceans (whales, dolphins and porpoises) are protected in Australia.

Taxon	Status	Rank	IUCN Criteria	EPBC	DEC Region	DEC District	Distribution	Flowering Period Recovery Plan
Acacia glaucocaesia	3				PILB	KARRATHA	Karratha, Port Hedland, Mardie, Roebourne, De Grey	Jul-Sep
Atriplex lindleyi subsp. conduplicata	3				GOLD,MWST,PILB,SCST	ESPERANCE,KALGOORLIE,KARRATHA,GERALDTON	Credo Stn, Norseman, Karratha Stn, Balfour Downs Stn	
Eragrostis lanicaulis	3				GOLD,PILB	KALGOORLIE,KARRATHA	Gibson Desert, Karratha	Mar-May/Aug-Oct
Owenia acidula	3				PILB	KARRATHA	Mardie Stn, Millstream, Collier Range, Winning Stn., Minilya Stn, Boolathana Stn, Qld, NSW	Aug
Stackhousia clementii	3				GOLD,PILB	KALGOORLIE,KARRATHA	Warburton, Wiluna, Karratha, Little Sandy Desert, NT, SA, Gnaraloo Stn, Burrup Peninsula	
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	3				PILB	KARRATHA	Karratha, Millstream, Hamersley Stn, West Angelas, Coondewanna Flats	
Vigna sp. rockpiles (R. Butcher et al. RB 1400)	3				PILB	KARRATHA	Karratha, Roebourne	May
Abutilon sp. Onslow (F. Smith s.n. 10/9/61) PN	1				PILB	KARRATHA	Onslow, Yaraloola Stn	Sep
Carpobrotus sp. Thevenard Island (M. White 050)	2				PILB	KARRATHA	Thevenard Island	
Eremophila forrestii subsp. viridis	3				PILB	KARRATHA	Onslow, Canning Stock Route	Aug
Triumfetta echinata	3				PILB	KARRATHA	Peedamulla Stn, Varoo Stn	

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 21/02/2014

Current Names Only Yes
Core Datasets Only Yes
Method 'By Polygon'
Group By Conservation Status

Conservation Status	Species	Records
Rare or likely to become extinct	5	14
Protected under international agreement	7	63
Non-conservation taxon	133	275
TOTAL	**145**	**352**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
2.	25336	*Chelonia mydas (Green Turtle)*		T	
3.	25346	*Dermochelys coriacea (Leatherback Turtle)*		T	
4.	25344	*Natator depressus (Flatback Turtle)*		T	
5.	24142	*Petrogale lateralis subsp. lateralis (Black-flanked Rock-wallaby, Black-footed Rock-wallaby)*		T	
Protected under international agreement					
6.	25560	*Ardea sacra (Eastern Reef Egret, Eastern Reef Heron)*		IA	
7.	24778	*Arenaria interpres subsp. interpres (Ruddy Turnstone)*		IA	
8.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*		IA	
9.	24716	*Puffinus pacificus (Wedge-tailed Shearwater)*		IA	
10.	24521	*Sterna bengalensis (Lesser Crested Tern)*		IA	
11.	24523	*Sterna caspia (Caspian Tern)*		IA	
12.	25640	*Sterna dougallii (Roseate Tern)*		IA	
Non-conservation taxon					
13.	3241	*Acacia bivenosa*			
14.	3270	*Acacia coriacea (Wirewood)*			
15.	11487	*Alectryon oleifolius subsp. oleifolius*			
16.	30831	*Amphibolurus gilberti (Ta-ta, Gilbert's Dragon)*			
17.	7827	*Angianthus cunninghamii (Coast Angianthus)*			
18.	-15342	*Anoplocapros amygdaloides?*			
19.	-15718	*Aracana aurita*			
20.	25567	*Artamus leucorynchus (White-breasted Woodswallow)*			
21.	-14788	*Atherinomorus endrachtensis*			
22.	2463	*Atriplex isatidea (Coast Saltbush)*			
23.	-14817	*Batrachomoeus sp.*			
24.	11670	*Capparis spinosa var. nummularia (Coastal Caper)*			
25.	-14700	*Carcharhinus melanopterus*			
26.	26559	*Caulerpa cupressoides*			
27.	26568	*Caulerpa lentillifera*			
28.	26573	*Caulerpa racemosa*			
29.	27386	*Caulerpa racemosa var. lamourouxii*			
30.	2776	*Commicarpus australis (Perennial Tar Vine)*			
31.	-17469	*Congrogadus subducens*			
32.	-17040	*Congrogadus winterbottomi*			
33.	4867	*Corchorus walcottii (Woolly Corchorus)*			
34.	24672	*Coturnix ypsilophora subsp. cervina (Brown Quail)*			
35.	24865	*Ctenophorus caudicinctus subsp. caudicinctus (Ring-tailed Dragon)*			
36.	25036	*Ctenotus duricola*			
37.	25043	*Ctenotus grandis subsp. titan*			
38.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
39.	13733	*Cuscuta victoriana*			
40.	777	*Cyperus bulbosus (Bush Onion, Tjanmata)*			
41.	25002	*Delma pax*			
42.	26782	*Digenea simplex*			

NatureMap
Mapping Western Australia's biodiversity

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
43.	-18003	*Dischistodus darwiniensis*			
44.	-17502	*Enneapterygius philippinus*			
45.	-17606	*Enoplosus armatus*			
46.	-17572	*Epinephelus sexfasciatus*			
47.	24569	*Epthianura crocea (Yellow Chat)*			
48.	42404	*Eremiascincus isolepis*			
49.	24360	*Esacus neglectus (Beach Stone-curlew)*			
50.	-15716	*Eubalichthys mosaicus*			
51.	11011	*Eulalia aurea*			
52.	4644	*Euphorbia sharkoensis*			
53.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
54.	35558	*Flaveria trinervia (Speedy Weed)*	Y		
55.	26835	*Galaxaura rugosa*			
56.	3916	*Gastrolobium polystachyum (Horned Poison)*			
57.	24956	*Gehyra pilbara*			
58.	24959	*Gehyra variegata*			
59.	-15377	*Gerres subfasciatus*			
60.	-16768	*Glaucosoma hebraicum*			
61.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
62.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
63.	26892	*Halimeda discoidea*			
64.	165	*Halophila spinulosa*			
65.	6706	*Heliotropium cunninghamii*			
66.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
67.	26949	*Hydroclathrus clathratus*			
68.	6633	*Ipomoea muelleri (Poison Morning Glory, Yumbu)*			
69.	6635	*Ipomoea pes-caprae*			
70.	-18106	*Isoodon obesulus subsp. barrowensis*			
71.	-15767	*Istiblennius edentulus*			
72.	-14450	*Istiblennius meleagris*			
73.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
74.	8098	*Launaea sarmentosa*			
75.	25125	*Lerista bipes*			
76.	30928	*Lerista clara*			
77.	-15391	*Lethrinus laticaudis*			
78.	25005	*Lialis burtonis*			
79.	9289	*Lobelia anceps (Angled Lobelia)*			
80.	-14340	*Lutjanus erythropterus*			
81.	-17952	*Lutjanus malabaricus?*			Y
82.	25759	*Megalurus timoriensis (Tawny Grassbird)*			
83.	-16710	*Minous sp.*			
84.	-15695	*Monacanthus chinensis*			
85.	-14739	*Nemipterus furcosus*			
86.	-16639	*Nemipterus peronii?*			Y
87.	-18002	*Omobranchus rotundiceps*			
88.	-12323	*Pallenopsis denticulata*			
89.	-13151	*Pallenopsis hoeki*			
90.	25543	*Pandion haliaetus (Osprey)*			
91.	-17442	*Paracaesio gonzalesi*			Y
92.	-13952	*Paramonacanthus choirocephalus*			
93.	-17154	*Paramonacanthus japonicus*			
94.	-12639	*Parapallene australiensis*			
95.	24642	*Passer montanus (Eurasian Tree Sparrow)*	Y		
96.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
97.	-14291	*Pentapodus vitta*			
98.	-17817	*Petroscirtes sp.*			
99.	25699	*Phalacrocorax varius (Pied Cormorant)*			
100.	-15999	*Pisodonophis boro*			
101.	-15331	*Polydactylus multiradiatus*			
102.	6653	*Polymeria ambigua (Morning Glory)*			
103.	2884	*Portulaca oleracea (Purslane, Wakati)*			
104.	-13963	*Psammoperca waigiensis*			
105.	25261	*Pseudechis australis (Mulga Snake)*			
106.	24239	*Pseudomys nanus (Western Chestnut Mouse)*			
107.	24063	*Pseudorca crassidens (False Killer Whale)*			
108.	24173	*Pteropus scapulatus (Little Red Flying-fox)*			
109.	2717	*Ptilotus divaricatus (Climbing Mulla Mulla)*			
110.	-17523	*Rastrelliger kanagurta*			
111.	24245	*Rattus rattus (Black Rat)*	Y		
112.	24246	*Rattus tunneyi (Pale Field-rat)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
113.	2584	*Rhagodia preissii*			
114.	11240	*Rhagodia preissii subsp. obovata*			
115.	4191	*Rhynchosia minima (Rhynchosia)*			
116.	27234	*Sargassum cristaefolium*			
117.	27245	*Sargassum ilicifolium*			
118.	-14126	*Saurida gracilis*			
119.	7606	*Scaevola crassifolia (Thick-leaved Fan-flower)*			
120.	7608	*Scaevola cunninghamii*			
121.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
122.	-16518	*Scomberoides tol*			
123.	-14592	*Scomberomorus commerson*			
124.	2818	*Sesuvium portulacastrum*			
125.	612	*Setaria surgens (Pigeon Grass)*			
126.	-13947	*Siganus fuscescens*			
127.	-15704	*Sillago burrus*			
128.	-15013	*Solenostomus cyanopterus*			
129.	-15031	*Sorosichthys ananassa*			
130.	625	*Spinifex longifolius (Beach Spinifex)*			
131.	635	*Sporobolus virginicus (Marine Couch)*			
132.	24522	*Sterna bergii (Crested Tern)*			
133.	7103	*Striga curviflora*			
134.	24946	*Strophurus strophurus*			
135.	-15190	*Symphorus nematophorus*			
136.	13339	*Synaptantha tillaeacea var. tillaeacea*			
137.	-16402	*Tathicarpus butleri*			
138.	4375	*Tribulus cistoides*			
139.	6727	*Trichodesma zeylanicum (Camel Bush, Kumbalin)*			
140.	13131	*Triodia epactia*			
141.	706	*Triraphis mollis (Needle Grass)*			
142.	-14257	*Upeneus sundaicus*			
143.	-17159	*Uranoscopus sp. 2*			
144.	728	*Whiteochloa cymbiformis*			
145.	-13839	*Zosterops luteus subsp. balstoni*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

NAME	SOURCE_CODE	SOURCE_ID	NAME_ID	FAMILY	GENUS	SPECIES	INFRARANK	INFRANAME	AUTHOR	VERNACULAR	KINGDOM	CONSV_CODE	CLASS
Calidris canutus subsp. rogersi	WAM_BIRDS	urn:lsid:taxonomy.org.au:AVIF:16667	24783	Scolopacidae	Calidris	canutus	subsp.	rogersi	Mathews	Red Knot (north-eastern Siberia)	Animalia	T	BIRD
Calidris ferruginea	BIRDATLAS2	36742|161	24784	Scolopacidae	Calidris	ferruginea			(Pontoppidan)	Curlew Sandpiper	Animalia	T	BIRD
Calidris tenuirostris	FAUNASURVEY	49980	24790	Scolopacidae	Calidris	tenuirostris			(Horsfield)	Great Knot	Animalia	T	BIRD
Charadrius leschenaultii subsp. leschenaultii	WAM_BIRDS	urn:lsid:taxonomy.org.au:AVIF:31136	24372	Charadriidae	Charadrius	leschenaultii	subsp.	leschenaultii	Lesson	Greater Sand Plover (Mongolian)	Animalia	T	BIRD
Charadrius mongolus	FAUNASURVEY	49987	25576	Charadriidae	Charadrius	mongolus			Pallas	Lesser Sand Plover	Animalia	T	BIRD
Chelonia mydas	FAUNASURVEY	506293	25336	Cheloniidae	Chelonia	mydas			(Linnaeus)	Green Turtle	Animalia	T	REPTILE
Dasyurus hallucatus	FAUNASURVEY	508770	24093	Dasyuridae	Dasyurus	hallucatus			Gould	Northern Quoll	Animalia	T	MAMMAL
Limosa lapponica subsp. menzbieri	WAM_BIRDS	urn:lsid:taxonomy.org.au:AVIF:31284	24796	Scolopacidae	Limosa	lapponica	subsp.	menzbieri	Portenko	Bar-tailed Godwit (northern Siberian)	Animalia	T	BIRD
Natator depressus	FAUNASURVEY	121164	25344	Cheloniidae	Natator	depressus			(Garman)	Flatback Turtle	Animalia	T	REPTILE
Numenius madagascariensis	TFAUNA	4116	24798	Scolopacidae	Numenius	madagascariensis			(Linnaeus)	Eastern Curlew	Animalia	T	BIRD
Perameles bougainville	WAM_MAMMALS	urn:lsid:taxonomy.org.au:MAMM:M16085	25504	Peramelidae	Perameles	bougainville			Quoy & Gaimard	Western Barred Bandicoot, Marl	Animalia	T	MAMMAL
Pezoporus occidentalis	TFAUNA	192	24743	Psittacidae	Pezoporus	occidentalis			(Gould)	Night Parrot	Animalia	T	BIRD
Pristis zijsron	FAUNASURVEY	598683	34037	Pristidae	Pristis	zijsron				Green Sawfish	Animalia	T	FISH
Sterna nereis subsp. nereis	WAM_BIRDS	urn:lsid:taxonomy.org.au:AVIF:18888	24530	Laridae	Sterna	nereis	subsp.	nereis	(Gould)	Fairy Tern	Animalia	T	BIRD
Crocodylus porosus	FAUNASURVEY	49947	24859	Crocodylidae	Crocodylus	porosus			Schneider	Salt-water Crocodile	Animalia	S	REPTILE
Dugong dugon	WAM_MAMMALS	urn:lsid:taxonomy.org.au:MAMM:M203	24084	Dugongidae	Dugong	dugon			(Muller)	Dugong	Animalia	S	MAMMAL
Falco peregrinus	FAUNASURVEY	102892	25624	Falconidae	Falco	peregrinus			Tunstall	Peregrine Falcon	Animalia	S	BIRD
Actitis hypoleucos	BIRDATLAS2	28946|157	41323	Scolopacidae	Actitis	hypoleucos				Common Sandpiper	Animalia	IA	BIRD
Apus pacificus	FAUNASURVEY	504785	25554	Apodidae	Apus	pacificus			(Latham)	Fork-tailed Swift	Animalia	IA	BIRD
Ardea modesta	BIRDATLAS2	199311|187	41324	Ardeidae	Ardea	modesta				Eastern Great Egret	Animalia	IA	BIRD
Ardea sacra	FAUNASURVEY	102625	25560	Ardeidae	Ardea	sacra			Gmelin	Eastern Reef Egret, Eastern Reef Heron	Animalia	IA	BIRD
Arenaria interpres	BIRDATLAS2	481571|129	25736	Scolopacidae	Arenaria	interpres			(Linnaeus)	Ruddy Turnstone	Animalia	IA	BIRD
Calidris acuminata	WAM_BIRDS	urn:lsid:taxonomy.org.au:AVIF:28980	24779	Scolopacidae	Calidris	acuminata			(Horsfield)	Sharp-tailed Sandpiper	Animalia	IA	BIRD
Calidris alba	BIRDATLAS2	481571|166	24780	Scolopacidae	Calidris	alba			(Pallas)	Sanderling	Animalia	IA	BIRD
Calidris ruficollis	BIRDATLAS2	426641|162	24788	Scolopacidae	Calidris	ruficollis			(Pallas)	Red-necked Stint	Animalia	IA	BIRD
Charadrius leschenaultii	BIRDATLAS2	453195|141	25575	Charadriidae	Charadrius	leschenaultii			Lesson	Greater Sand Plover	Animalia	IA	BIRD
Chlidonias leucopterus	BIRDATLAS2	5029291|109	41332	Laridae	Chlidonias	leucopterus			Temminck	White-winged Black Tern	Animalia	IA	BIRD
Egretta sacra	BIRDATLAS1	20923|191	41336	Ardeidae	Egretta	sacra				Eastern Reef Egret, Eastern Reef Heron	Animalia	IA	BIRD
Glareola maldivarum	FAUNASURVEY	49990	24481	Glareolidae	Glareola	maldivarum			J.R. Forster	Oriental Pratincole	Animalia	IA	BIRD
Haliaeetus leucogaster	FAUNASURVEY	49967	24293	Accipitridae	Haliaeetus	leucogaster			(Gmelin)	White-bellied Sea-Eagle	Animalia	IA	BIRD
Limosa lapponica	BIRDATLAS1	43104|153	30932	Scolopacidae	Limosa	lapponica			(Linnaeus)	Bar-tailed Godwit	Animalia	IA	BIRD
Merops ornatus	FAUNASURVEY	103317	24598	Meropidae	Merops	ornatus			Latham	Rainbow Bee-eater	Animalia	IA	BIRD
Numenius minutus	BIRDATLAS2	426641|151	24799	Scolopacidae	Numenius	minutus			Gould	Little Curlew	Animalia	IA	BIRD
Numenius phaeopus	BIRDATLAS2	498554|150	25742	Scolopacidae	Numenius	phaeopus			(Linnaeus)	Whimbrel	Animalia	IA	BIRD
Pluvialis squatarola	BIRDATLAS2	481571|136	24383	Charadriidae	Pluvialis	squatarola			(Linnaeus)	Grey Plover	Animalia	IA	BIRD
Sterna bengalensis	FAUNASURVEY	49994	24521	Laridae	Sterna	bengalensis			Lesson	Lesser Crested Tern	Animalia	IA	BIRD
Sterna caspia	FAUNASURVEY	103954	24523	Laridae	Sterna	caspia			Pallas	Caspian Tern	Animalia	IA	BIRD
Sterna dougallii	BIRDATLAS2	28946|113	25640	Laridae	Sterna	dougallii			Montagu	Roseate Tern	Animalia	IA	BIRD
Sterna hirundo	FAUNASURVEY	49996	25642	Laridae	Sterna	hirundo			Linnaeus	Common Tern	Animalia	IA	BIRD
Sterna leucoptera	FAUNASURVEY	49998	24529	Laridae	Sterna	leucoptera			Temminck	White-winged Black Tern	Animalia	IA	BIRD
Tringa brevipes	BIRDATLAS2	498554|155	24803	Scolopacidae	Tringa	brevipes			(Vieillot)	Grey-tailed Tattler	Animalia	IA	BIRD
Tringa glareola	FAUNASURVEY	49976	24806	Scolopacidae	Tringa	glareola			Linnaeus	Wood Sandpiper	Animalia	IA	BIRD
Tringa nebularia	BIRDATLAS2	481571|158	24808	Scolopacidae	Tringa	nebularia			(Gunnerus)	Common Greenshank	Animalia	IA	BIRD
Lerista planiventralis subsp. maryani	WAM_REPTILES	urn:lsid:taxonomy.org.au:REPT:R104331	25164	Scincidae	Lerista	planiventralis	subsp.	maryani	Storr	Keeled Slider (NW coast Onslow to Barradale), skink	Animalia	1	REPTILE
Ardeotis australis	FAUNASURVEY	508388	24610	Otididae	Ardeotis	australis			(J.E. Gray)	Australian Bustard	Animalia	4	BIRD
Burhinus grallarius	FAUNASURVEY	506286	24359	Burhinidae	Burhinus	grallarius			(Latham)	Bush Stone-curlew	Animalia	4	BIRD
Leggadina lakedownensis	WAM_MAMMALS	urn:lsid:taxonomy.org.au:MAMM:M49023	24217	Muridae	Leggadina	lakedownensis			Watts	Short-tailed Mouse, Karekanga	Animalia	4	MAMMAL
Neochmia ruficauda subsp. subclarescens	TFAUNA	10999	34010	Estrildidae	Neochmia	ruficauda	subsp.	subclarescens	Mathews	Star Finch (western)	Animalia	4	BIRD
Phaps histrionica	FAUNASURVEY	50000	24411	Columbidae	Phaps	histrionica			(Gould)	Flock Bronzewing, Flock Pigeon	Animalia	4	BIRD

NAME	NAME_ID	FAMILY	GENUS	SPECIES	INFRARANK	INFRANAME	AUTHOR	VERNACULAR	KINGDOM	CONSV_CODE	CLASS
Calidris ferruginea	24784	Scolopacidae	Calidris	ferruginea			(Pontoppidan)	Curlew Sandpiper	Animalia	T	BIRD
Calidris tenuirostris	24790	Scolopacidae	Calidris	tenuirostris			(Horsfield)	Great Knot	Animalia	T	BIRD
Charadrius mongolus	25576	Charadriidae	Charadrius	mongolus			Pallas	Lesser Sand Plover	Animalia	T	BIRD
Dasyurus hallucatus	24093	Dasyuridae	Dasyurus	hallucatus			Gould	Northern Quoll	Animalia	T	MAMMAL
Natator depressus	25344	Cheloniidae	Natator	depressus			(Garman)	Flatback Turtle	Animalia	T	REPTILE
Numenius madagascariensis	24798	Scolopacidae	Numenius	madagascariensis			(Linnaeus)	Eastern Curlew	Animalia	T	BIRD
Sterna nereis subsp. nereis	24530	Laridae	Sterna	nereis	subsp.	nereis	(Gould)	Fairy Tern	Animalia	T	BIRD
Dugong dugon	24084	Dugongidae	Dugong	dugon			(Muller)	Dugong	Animalia	S	MAMMAL
Actitis hypoleucos	41323	Scolopacidae	Actitis	hypoleucos				Common Sandpiper	Animalia	IA	BIRD
Ardea modesta	41324	Ardeidae	Ardea	modesta				Eastern Great Egret	Animalia	IA	BIRD
Arenaria interpres	25736	Scolopacidae	Arenaria	interpres			(Linnaeus)	Ruddy Turnstone	Animalia	IA	BIRD
Arenaria interpres subsp. interpres	24778	Scolopacidae	Arenaria	interpres	subsp.	interpres	(Linnaeus)	Ruddy Turnstone	Animalia	IA	BIRD
Calidris ruficollis	24788	Scolopacidae	Calidris	ruficollis			(Pallas)	Red-necked Stint	Animalia	IA	BIRD
Charadrius leschenaultii	25575	Charadriidae	Charadrius	leschenaultii			Lesson	Greater Sand Plover	Animalia	IA	BIRD
Chlidonias leucopterus	41332	Laridae	Chlidonias	leucopterus			Temminck	White-winged Black Tern	Animalia	IA	BIRD
Egretta sacra	41336	Ardeidae	Egretta	sacra				Eastern Reef Egret, Eastern Reef Heron	Animalia	IA	BIRD
Gallinago stenura	24793	Scolopacidae	Gallinago	stenura			(Bonaparte)	Pin-tailed Snipe	Animalia	IA	BIRD
Glareola maldivarum	24481	Glareolidae	Glareola	maldivarum			J.R. Forster	Oriental Pratincole	Animalia	IA	BIRD
Haliaeetus leucogaster	24293	Accipitridae	Haliaeetus	leucogaster			(Gmelin)	White-bellied Sea-Eagle	Animalia	IA	BIRD
Limosa lapponica	30932	Scolopacidae	Limosa	lapponica			(Linnaeus)	Bar-tailed Godwit	Animalia	IA	BIRD
Merops ornatus	24598	Meropidae	Merops	ornatus			Latham	Rainbow Bee-eater	Animalia	IA	BIRD
Numenius phaeopus	25742	Scolopacidae	Numenius	phaeopus			(Linnaeus)	Whimbrel	Animalia	IA	BIRD
Pluvialis fulva	24382	Charadriidae	Pluvialis	fulva			(Gmelin)	Pacific Golden Plover	Animalia	IA	BIRD
Pluvialis squatarola	24383	Charadriidae	Pluvialis	squatarola			(Linnaeus)	Grey Plover	Animalia	IA	BIRD
Puffinus pacificus	24716	Procellariidae	Puffinus	pacificus			(Gmelin)	Wedge-tailed Shearwater	Animalia	IA	BIRD
Sterna caspia	24523	Laridae	Sterna	caspia			Pallas	Caspian Tern	Animalia	IA	BIRD
Sterna hirundo	25642	Laridae	Sterna	hirundo			Linnaeus	Common Tern	Animalia	IA	BIRD
Tringa brevipes	24803	Scolopacidae	Tringa	brevipes			(Vieillot)	Grey-tailed Tattler	Animalia	IA	BIRD
Tringa glareola	24806	Scolopacidae	Tringa	glareola			Linnaeus	Wood Sandpiper	Animalia	IA	BIRD
Tringa nebularia	24808	Scolopacidae	Tringa	nebularia			(Gunnerus)	Common Greenshank	Animalia	IA	BIRD
Tringa stagnatilis	24809	Scolopacidae	Tringa	stagnatilis			(Bechstein)	Marsh Sandpiper	Animalia	IA	BIRD
Xenus cinereus	41351	Scolopacidae	Xenus	cinereus				Terek Sandpiper	Animalia	IA	BIRD
Mormopterus loriae subsp. cobourgiana	34148	Molossidae	Mormopterus	loriae	subsp.	cobourgiana	Johnson	Little North-western Mastiff Bat	Animalia	1	MAMMAL
Lagorchestes conspicillatus subsp. leichardti	24122	Macropodidae	Lagorchestes	conspicillatus	subsp.	leichardti	Gould	Spectacled Hare-wallaby	Animalia	3	MAMMAL
Ardeotis australis	24610	Otididae	Ardeotis	australis			(J.E. Gray)	Australian Bustard	Animalia	4	BIRD
Leggadina lakedownensis	24217	Muridae	Leggadina	lakedownensis			Watts	Short-tailed Mouse, Karekanga	Animalia	4	MAMMAL
Macroderma gigas	24180	Megadermatidae	Macroderma	gigas			(Dobson)	Ghost Bat	Animalia	4	MAMMAL
Notoscincus butleri	25196	Scincidae	Notoscincus	butleri			Storr	Lined Soil-crevice Skink	Animalia	4	REPTILE
Pseudomys chapmani	24233	Muridae	Pseudomys	chapmani			Kitchener	Western Pebble-mound Mouse, Ngadji	Animalia	4	MAMMAL
Sousa chinensis	24064	Delphinidae	Sousa	chinensis			(Osbeck)	Indo-Pacific Humpback Dolphin	Animalia	4	MAMMAL

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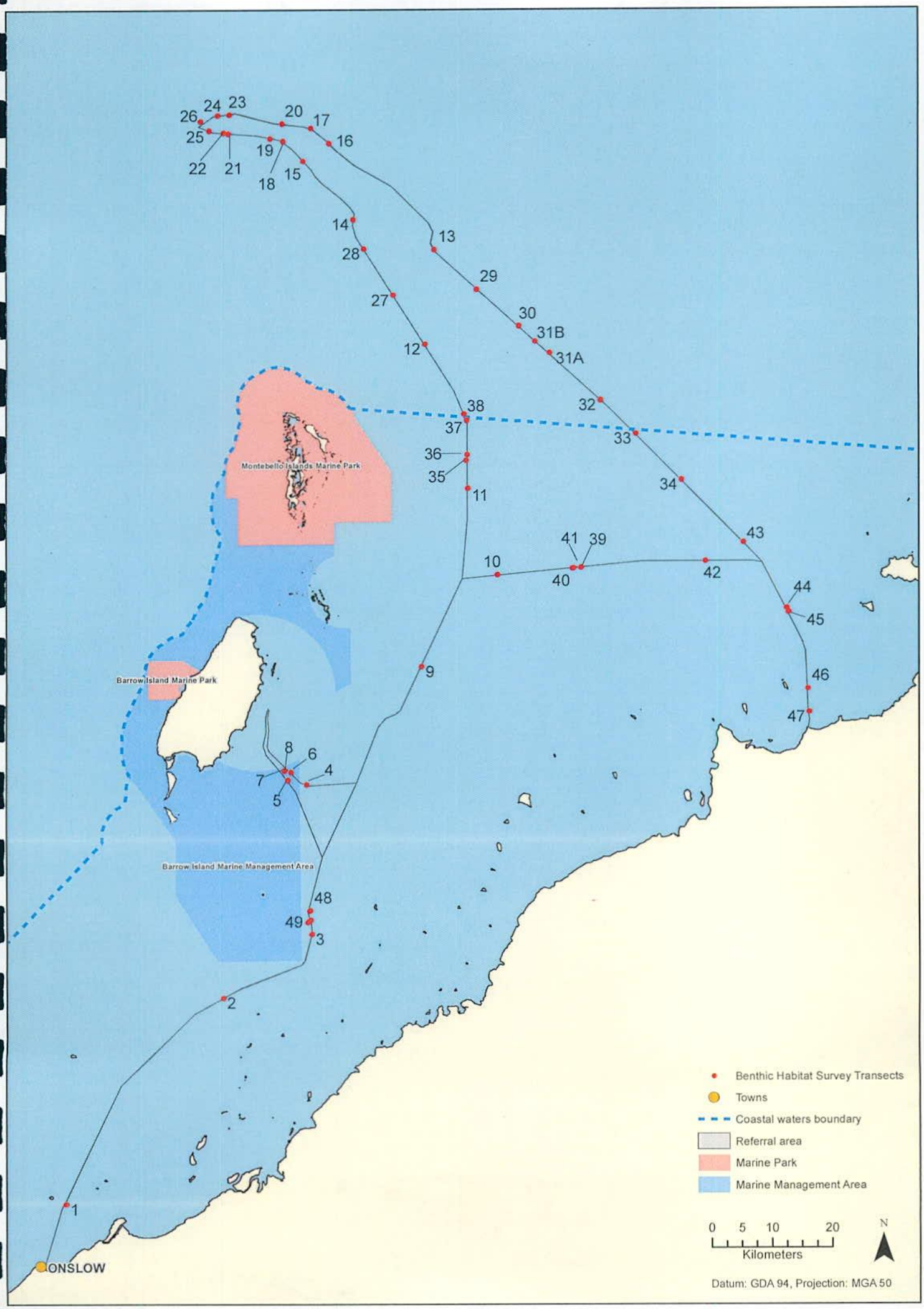
APPENDIX D BENTHIC HABITAT SURVEY SUMMARY

Transect number	Location	Depth (m)	Habitat description
1	Onslow nearshore waters	8.5	Reef and sediment substrate with areas of low to high bioturbation. The reef cover is between 1-20% and is low profile (<1m), with patchy red brown algae, sparse filter feeders including large sponges and sea fans.
2	Between Onslow and BWI	13.5	Generally flat bathymetry with fine sand to gravel sediments, some areas of cobble reef substrate. Reef cover is between 61-80%, moderate to patchy cover of red brown algae with a diverse array of benthic sessile invertebrates including gorgonians (sea fans and whips), soft corals, sponges, also reef fish, sea stars and sea cucumbers were found.
3	Between Onslow and BWI	12	Fine sand to gravel sediments, shell rubble, low profile to flat bathymetry and no bioturbation. Patchy red and brown macroalgae, sparse filter feeders and coral, fish.
4	BWI approach route	15.5	Sand to mostly gravel sediment, flat, low bioturbation, no reef structure. Seagrass beds (mostly likely Halophila sp.) and sparse filter feeders including sponges and sea cucumbers.
5	BWI approach route. within management area	14.5	Patches of sand to gravel substrate, some areas of rocky reef, flat profile and low bioturbation. The reef cover ranges between 1-20%, some seagrass beds (likely to be Lobophyton/Sacrophyton), a diverse array of benthic sessile invertebrates that include gorgonians (sea fans and whips), colourful sponges, ascidians, some areas of sparse hard coral and some soft corals.
6	BWI approach route. within management area	14.5	Sandy substrate with ripples 1-10 cm, no bioturbation, generally flat profile. Sparse filter feeders, including the occasional sea whip and sponge.
7	BWI approach route. within management area	14.5	Sandy substrate, flat profile, low biturbation. Seagrass beds (likely to be Halophila sp.), sparse filter feeders including sea whips, sponges and sea fans, reef fish, sea cucumbers and schools of larger fish were also observed.
8	BWI approach route. within management area	14.5	Sandy substrate, flat profile, low biturbation, moderate cover seagrass beds of Halophila, sparse filter feeders.
9	East of BWI between BWI and Montebello Is.	21.5	Sandy substrate, flat profile, no bioturbation. Mostly sand, some areas of sparse seagrass and filter feeders including, barrel sponge, sparse macroalgae, soft coral, fish.
10	Trunk line 1	32	Sand to gravel sediments and areas of rocky reef structure, flat profile, areas of low bioturbation. Reef coverage ranges between 1-20%, some reef fish, moderate filter feeder cover including sea whips, sea fans.
11	East of Montebello Islands	38	Sandy substrate and some areas of low profile rocky reef (<1m), low bioturbation. Reef coverage ranges between 1-20%, moderate filter feeder cover including sea whips, sea fans.

Transect number	Location	Depth (m)	Habitat description
12	North east of Montebello islands	53	Sandy substrate, flat profile, no bioturbation. Mostly sand, occasional small fish and filter feeder.
13	Wheatstone East	69.5	Sandy substrate, flat profile, no bioturbation. No reef, coral, seagrass or macroalgae.
14	Wheatstone West	73.5	Sand to gravel sediments, flat profile, no bioturbation. Sparse benthic sessile invertebrates such as sponges, sea fans, sea whips.
15	Wheatstone West	70	Gravel substrate, no bioturbation, low profile reef platform (<1m). Reef coverage ranges between 21-40% and has a dense coverage of filter feeders including sponges, sea fans, barrel sponge, sea whips.
16	Wheatstone East	72	Areas of rocky reef and gravel substrate, no bioturbation. Reef coverage between 21-60% with a moderate to high cover of filter feeders including sponges, sea fan, barrel sponge, sea whips.
17	Wheatstone East	71	Pebble to gravel sediments, flat profile. Very sparse filter feeders like sponges.
18	Wheatstone West	79	Sandy to gravel sediments, 1-10cm ripples, no bioturbation. Sparse filter feeders including sponges, sea whips.
19	Wheatstone West	82	Mostly sandy substrate, no bioturbation, some areas of low profile rocky reef platform (<1m). Some areas of sparse filter feeders such as sponges, sea whips.
20	Wheatstone East	79	Mostly gravel substrate, flat profile, no bioturbation, areas of low profile cobble reef platform (<1m). Reef cover is between 1-20% with sparse filter feeders, sea cucumber, sea whips, sea fan.
21	Wheatstone West	84	Gravel to pebble sediment, flat profile, no bioturbation. No filter feeders, macroalgae or seagrass, nothing but coarse gravel sediments.
22	Wheatstone West	86	Coarse gravel substrate, no bioturbation, flat profile. No filter feeders, macroalgae or seagrass, nothing but coarse gravel sediments.
23	Wheatstone East	85	Rock to gravel substrate, no bioturbation, areas of low profile rocky reef (<1m). Filter feeders found in areas with hard rocky reef platform, sea whips, sea fans, sponges, soft coral and small fish.
24	Wheatstone East	85	Gravel substrate, no bioturbation, flat profile, the very occasional filter feeder was also observed.
25	Wheatstone West	86.5	Gravel substrate with low bioturbation, very sparse filter feeders, sea fan, sea whips.
26	Wheatstone East	83	Pebble substrate, flat profile, no bioturbation - one area of high bioturbation. Rocky reef cover of 21-40% rocky with a high density of filter feeders and small fish.
27	Wheatstone West	85	Mostly sand with some areas of coarse gravel, flat profile and no bioturbation. The very occasional filter feeder such as a sponge and fish.
28	Wheatstone West	72	Gravel to pebble sediment, flat profile, no bioturbation. No filter feeders or macroalgae or seagrass.
29	Wheatstone East	62	Sand to gravel sediment, some areas of low bioturbation. No macroalgae or seagrass, very sparse filter feeders but mostly coarse sand.
30	Wheatstone East	54	Sand substrate, areas of low bioturbation. No filter feeders, macroalgae or seagrass.

Transect number	Location	Depth (m)	Habitat description
31	Wheatstone East	53	Sand substrate, areas of low bioturbation. No filter feeders, macroalgae or seagrass.
32	Wheatstone East	45	Sand substrate, areas of low bioturbation. No filter feeders, macroalgae or seagrass.
33	Wheatstone East	42	Sand to gravel sediment, small area of bioturbation. No filter feeders or macroalgae or seagrass.
34	Wheatstone East	42	Sand to gravel sediment, flat profile, low bioturbation. Very sparse filter feeders.
35	Wheatstone West, east of Montebello Islands	42	Sand to gravel sediment, flat profile, low bioturbation. Very sparse soft corals and filter feeders.
36	Wheatstone West, east of Montebello Islands	42.5	Sand to gravel sediment, flat profile, low to medium bioturbation. Very sparse sessile benthic invertebrates including gorgonians (sea fans and whips), sea cucumber and small fish.
37	Wheatstone West, east of Montebello Islands	45	Sandy substrate, flat profile, low bioturbation, very sparse filter feeders.
38	Wheatstone West, east of Montebello Islands	46.5	Coarse sand sediment, flat profile, low bioturbation, very sparse filter feeders: sponges, sea whip.
39	Trunk line 1	31.5	Sand substrate and some areas of boulders, no bioturbation. Areas of dense macroalgae (red brown algae), lots of fish, areas of dense filter feeders including sponges, sea whips, sea fans.
40	Trunk line 1	33	Sand substrate with areas of cobbles, flat profile, low to medium bioturbation. Areas of thick macroalgae, lots of small fish, filter feeders including sponges, sea stars, sea fans, barrel sponges, sea whips.
41	Trunk line 1	32	Sand substrate with some areas of boulders, low profile (1-10 cm) and low bioturbation. Reef cover of 1-20%, with sparse to moderate coverage of filter feeders including sea whips, sponges, interspersed with large patches of sand, a sea snake and sparse soft coral.
42	Trunk line 1	32	Sand to gravel substrate, low bioturbation. Red and brown algae, sparse filter feeders including sea whips and sponges.
43	Wheatstone East	34.5	Sand to gravel substrate, flat profile, no bioturbation. Moderate coverage of red and brown algae, moderate coverage of filter feeders including sponges and sea whips, and small reef fish.
44	Trunk 1 – nearshore Gnoorea Point	16	Sand to gravel substrate, flat profile, no bioturbation. No filter feeders or macroalgae or seagrass.
45	Trunk 1 – nearshore Gnoorea Point	13.5	Low profile reef comprising boulders and cobbles, and areas of sand substrate, no bioturbation. Reef cover is 1-20% with areas of 61-80% reef cover. Moderate cover of red and brown algae, moderate to high cover of filter feeders including seawhips, sponges and seafans, moderate to high cover of hard coral, and reef fish.

Transect number	Location	Depth (m)	Habitat description
46	Trunk 1 – nearshore waters of Gnoorea Point	8	Sand to gravel substrate, low profile, no bioturbation. Sparse coverage of red brown algae and areas of sparse filter feeders.
47	Trunk 1 – nearshore waters of Gnoorea Point	5.5	Sand to gravel substrate, low profile, no bioturbation. Some patches of red brown algae, patches of seagrass (likely halophila sp.), very sparse filter feeders.
48	Trunk 1 – edge of BWI management area	13.5	Medium sand to coarse sand, low to moderate profile, low to no bioturbation. Sparse filter feeders and some fish.
49	Trunk 1 – edge of BWI management area	14	Gravel to sand, low profile, no bioturbation. Reef cover 1-20% and areas of 21-40%, low to moderate coverage of red brown algae (likely to be halimeda) and other large algae, moderate to high filter feeders, some hard corals.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Montebello Islands Marine Park
Barrow Island Marine Park
Barrow Island Marine Management Area
ONSLOW
Benthic Habitat Survey Transects
Towns
Coastal waters boundary
Referral area
Marine Park
Marine Management Area
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Datum: GDA 94, Projection: MGA 50

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